The Mines of The Bellambi Coal Co. Ltd

Southern
Coal District
New South Wales

THE enclosed Series of Photographs, representing the General Operations of Winning, Discharging and Shipping Coal from the property of The Bellambi Coal Company, Limited, in New South Wales, are handed to you for your kind acceptance, with the best wishes of the Board of Directors and of the General Manager.

Christmas, 1909.

90-92 William Street,
MELBOURNE.

9 Bridge Street,
SYDNEY.

THE MINES

OF

THE BELLAMBI COAL CO.,

LIMITED.

90-92 WILLIAM STREET, MELBOURNE,

VICTORIA.

9 BRIDGE STREET, SYDNEY,

NEW SOUTH WALES

1909.

MARCHANT & Co. Ltd. Printers Sydney.
Photos by HALL & Co. Hunter Street Sydney.

INTRODUCTORY.

THE BELLAMBI COAL COMPANY LIMITED was constituted in 1888 with a capital of £60,000 to open and develop the Bellambi Coal mine, which was one of the earliest mines worked in the Illawarra district In the "Empire" Newspaper Company's publication of 8th September, 1858, appears this notice —

"BELLAMBI COAL. Two hundred and fifty tons of coal have been put on board the mail steamer 'European,' so that a fair opportunity of testing this coal for steam purposes will be afforded during the coming trip" And, on 16th May, 1859, the following testimonials appeared in the Sydney daily papers —

"Mr Champion Wetton Superintendent Royal Mail Steam Packet Company, writes 'I am decidedly of opinion that when care is taken to hand-pick the Illawarra coal, either from your pits or Mr. Osborne's, that they will be found little, if at all, inferior to coal shipped from Home'

"Francis Napier & Company, Vulcan Foundry, Sydney, write —'Having had considerable experience in the use of Bellambi coal, we are of opinion that for steam purposes, forges, and for making coke, it is superior to any other coal in the Colony'

"Balmain Steam Saw Mills, John Booth writes.—'Having used the Bellambi coals for the last eight months, I am decidedly of opinion that they are superior to any other in New South Wales for steam purposes as yet tried'"

The mine had thus been well known fully 30 years previously, but difficulties of traction and other matters had caused it to be undeveloped until the Bellambi Company took it in hand.

The original capital was £60,000, and with this the mine was equipped on a moderate scale to put out about 450 tons a day Subsequently the Company acquired the business of Mitchell and Waley, who controlled at that time the output of the adjoining South Bulli mine, and thereafter the two were worked in conjunction

The original directors of the Company were the Hon Sir Malcolm D McEacharn, K B (then Mr McEacharn) the Hon N Fitzgerald, M L C, Victoria; the Hon Thos Loader, M.L C, Victoria, Mr R R Woolcott, Victoria, Colonel James Burns, Sydney, and Mr Adam Forsyth, Sydney. Of these, the Hon Sir Malcolm D McEacharn, K B, still retains the Chairmanship, and has given to this Company very keen and close personal attention throughout. The two Sydney Directors, Colonel the Hon James Burns, M L C, and Mr Adam Forsyth still remain on the Board, but death has removed the whole of the other gentlemen originally constituting the Directorate. The late Mr David Syme was for some years a member of the Board, and his sound business judgment proved of much assistance.

The present Directors, in addition to the Hon Sir Malcolm D McEacharn, K B, Colonel the Hon. James Burns, M L C, and Mr Adam Forsyth, are Mr J C Stewart (Acting Chairman), a member of the well-known firm of Malleson, England, & Stewart, and Mr George A W Stewart, both of Melbourne.

The registered office of the Company is in the Southern capital, and Mr W W Gudgeon, the present Secretary, has been associated with the concern in that position since its formation.

The general business of the Company is carried on in Sydney. Mr F G Waley, Assoc. M.I.M.E., being General Manager and having occupied that responsible position since the Company acquired the business with which he was then connected, and the mines are under the direct charge of Mr A. E O Sellers, M.I M.E.

The powerful shipping influence of the Board caused the business of the Company to expand at a rapid rate, and in 1901 the Directors decided to purchase the adjoining South Bulli Colliery, and for that purpose the capital was increased to £125,000 and £80,000 was also issued in Debentures.

In 1904, the capital was further increased to £250,000, which is now all fully paid up, and the Debentures having been redeemed, this represents the Company's total liability to the public at the present time.

In 1890, the second year after the Company started operations, the output of large and small coal was something over 50,000 tons. In 1893 this output had increased to 155,000 tons, in 1898 to 214,000 tons, in 1903 to 481,000 tons, and in 1908 to 550,000 tons, and at present the output is about 2,200 tons daily.

The Company's fleet at the time of commencing operations consisted of two steamers, the "Egmont" and "Currajong," of a carrying capacity of 1,100 tons, and a Hulk, carrying 600 tons.

In 1898, the "Egmont" having meantime been sold, the steamer "Werfa" was purchased, having a capacity of 1,140 tons, and was at the time the largest collier employed in the bunkering trade in Sydney. In 1901 the Company acquired the "Malachite" with a capacity of 700 tons; in 1902 the "Marjorie" with a capacity of 1,250 tons, and in 1908 a new steamer built to its own designs, named the "Bellambi," with a capacity of 1,600 tons, was imported, and this fleet of five colliers is employed exclusively trading between the Company's private jetty at Bellambi and Sydney, the whole of the coal brought up by these boats being delivered into the bunkers of its various contracts. In addition to this, the Company has a fine iron hulk, the "Argo," completely fitted with all appliances for rapid discharging and with a capacity of 1,800 tons, so that its present coal storage afloat is equal to 7,000 tons, and its contracts cover the following lines of mail and passenger steamships:—

Orient Line of Royal Mail Steamers.
Norddeutscher Lloyd.
Oceanic S.S. Co.
Nippon Yusen Kaisha.
White Star Line (Liverpool).
Federal S.N. Co., Ltd.
Houlder Bros & Co., Ltd.
McIlwraith, McEacharn & Co. Pty., Ltd.
Swedish Australian S.S. Co.
The Broken Hill Proprietary Co., Ltd.
and Others.

The Company's property comprises, in all, an area of nearly 8,000 acres of freehold and leasehold land, 2 fully equipped collieries, a very large electrical power plant, rolling stock, locomotives, &c., some ten miles of private railway, and a private jetty, the whole being designed strictly in accordance with modern lines.

This book of photos will seek to illustrate some of the features of the Company's property, both above and below ground, its system of loading at its open roadstead jetty, the discharging of its colliers, and the bunkering of its contract boats in Sydney, and it is hoped that these illustrations may prove of some interest and give a general idea of the variety and scope of the Company's enterprise.

The South Bulli and Bellambi Collieries, the property of the Bellambi Coal Co, Ltd, are situated 42 miles to the south of Sydney, in the Illawarra district, and the coal is of the quality known as semi-bituminous and highly valuable for steaming purposes The average analysis taken by Mr Pittman, Government Geologist and Under Secretary for Mines for New South Wales, is as follows:—

Hydro Moisture - -	1.00%
Vol Hydro Carbon	25.40%
Fixed Carbon -	66.00 %
Ash - - -	7.60
Calorific Value - -	1lb evaporates 13lbs of water

The series of tests taken by the Institute of Marine Engineers in England as regards the calorific value are rather better. The average of three analyses taken in 1907 with Darling's Calorimeter gave an evaporative power of 13.58lbs of water per lb. of coal

The seam varies from 7 feet in the Eastern workings to upwards of 9 feet in the Western workings, and is absolutely free of any band or intrusive foreign matter of any kind

The following instructions and remarks issued by the Company on the best method of burning the coal for steam raising purposes will prove of interest here and are therefore reproduced in extenso:—

The Bellambi Coal Company Limited, supplies Southern (New South Wales) Coals under contract to many of the various lines of Mail Steamers trading to Sydney, and the attached hints as to the best method of firing same may prove of interest

The Southern Coal of New South Wales stows in 40 cubic feet to the ton, and the comparative absence of Volatile Hydro-Carbons makes it almost absolutely smokeless; indeed, when its use is once thoroughly understood by those in the stokehole only a very light smoke will arise at the moment of firing and the fires will burn steadily without ever showing any column of smoke from the funnels, while as the coal does not "soot" and block up the back ends and

tubes of the boilers there is complete absence of the burning of tube ends. No doubt it is these facts that have induced all the principal Mail Companies to burn Southern Coal when coaling in Sydney, and in other Australian ports where it is obtainable.

An important apparent difficulty with Southern Coal is that like those of Cardiff in South Wales and the Pocahontas coal in America, the coal is very friable, and by the time it has been loaded at the open roadstead south of Sydney, brought up by Steam Colliers and then dumped into bunkers or holds of the consuming steamer, it makes a very large percentage of small or broken coal. All possible measures have been adopted with a view to minimising this breakage, and from our own mines we extract daily about 600 tons of small coal before shipping 1,300 tons of large, and yet by the time the coal reaches the consuming steamer it is again very much broken up. The result of this is that unless carefully fired, a portion is only partly consumed and goes away with the ash.

Southern coal is free from bands of dirt or impurity, and the bulk of the large coke requirements of Australia and Tasmania are made from the small coal of the Southern collieries, and at our own mines, the Broken Hill Proprietary Co., Ltd., has 120 ovens erected and consumes over 300 tons of small coal per day, without washing or cleaning before coking.

The test of the Government Analyst shows that on an average one lb. of Southern coal will evaporate about 13¾lbs. of water, but the firing is a difficulty until the process has not only been thoroughly mastered by those in charge, but economical working has been impressed on every fireman in the stokehole. Southern coal requires to be fired very lightly and almost continuously, only a small quantity being thrown on the fire on each occasion. The tendency to charge the fires heavily and then to close the furnace doors for a considerable period is fatal if the best results are to be obtained from Southern coal, which from its density requires a strong draft and must not be heaped on the furnaces. A bright red fire fired quickly and with very little coal at a time will give an enormous head of steam on a small consumption. The coal requires to be thrown well back in the furnace and not at the mouth of it, as if the mouth of the furnace is choked with coal the strong draft requisite to get the best results from the mineral is lost. We need not point out that the proper carrying out of the firing on these lines entails considerably more work as well as a certain amount of common sense on the part of the firemen, and it is a curious thing that the very best results that have been obtained from Southern coal are obtained where

Lascar or Japanese firemen are employed in the stokehole, the reasons probably being that the men are more amenable to discipline and will do exactly what they are told, and a greater number of firemen are carried when this class of labour is employed.

An important question is the spacing of the firebars and the length of the funnels of steamers burning Southern coal. The coal cannot have too much natural draft, and every one of the older steamers of the Orient Co. have had their funnels considerably lengthened within the last few years, while on all boats trading regularly to Australia the smoke stacks are built very high and of good diameter. Forced draft does not seem to have the same effect on the coal as a big natural draft, and if forced draft be applied too violently and without sufficient length of smoke stack, the coal will have a tendency to smelt the firebars. The firebars themselves should be spaced not less than ½-in. apart. Nothing closer than this has given satisfactory results.

In conclusion, we may state that we are satisfied that with a little perseverance and careful following out of the instructions contained in this letter better steaming results can be obtained from the Southern coal of N. S. Wales than from any coal in Australia:—

(a) On moderate consumption and stowage space.

(b) With an almost entire absence of smoke, and its consequent advantage to back ends and tubes.

To generate steam last enough with the above advantages needs the hearty and energetic co-operation of the engine-room staff as well as those employed in the stokehole until such time as the method of handling this coal to best advantage has been mastered and appreciated.

The Present Directors of the Bellambi Coal Company, Limited.
Names of each appear under their respective photographs.

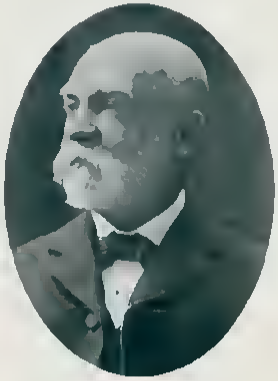
J. C STEWART, Esq
(Malleson, England & Stewart)

The Hon Sir MALCOLM D. McEACHARN, K.B.
(Chairman)

G. A. W. STEWART, Esq

W. W. GUDGEON, Esq., F.I.A.V.
(Secretary)

Colonel the Hon. JAMES BURNS, M.L.C.



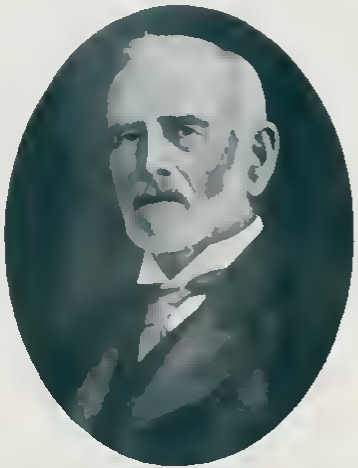
ADAM FORSYTH, Esq
(Burns Philp & Co., Ltd.)

The Past Directors of the Bellambi Coal Company, Limited.
Names of each appear under their respective photographs.

The Hon NICHOLAS FITZGERALD, M L C, Vic.
(deceased).

The late Mr R R WOOLCOTT, J P

The Hon. THOMAS LOADER M L C Vic.
(deceased).



The late Mr DAVID SYME

F. G. WALEY, General Manager of Company.
(Views of Sydney Harbour and Company's Offices to right.)

SYDNEY STAFF.—In the foreground (centre) will be seen Mr. W. G. C. Millard (Accountant), on his right Mr. W. O. Healy (Foreman Stevedore and in charge of the whole of the bunkering operations in Sydney), on his left Mr. J. Macartney (Superintendent Engineer), the other members of the staff being grouped behind them. Both Mr. Millard and Mr. Healy have been associated with the business of the Company since its inception. To the left is a photograph of the Colliery Manager, Mr. A. E. Sellers, M.I.M.E.

The following photographs are intended to convey impressions of a visit to the Company's mines, for which purpose it is assumed that the visitor has proceeded from Sydney and has arrived alongside the jetty in a Collier sent down to load coal. The process of working the jetty and loading the coal thereon and putting it aboard the steamer will be shown in the illustrations, and the visitor will then be taken from the jetty along the Company's South Bulli railway line, illustrations of the route being given, thence up the incline to the main entrance to the colliery and the screens, and some views of the mine inside will be shown, and the visitor will be brought out by the new tunnel, which dips from the present 8 ft seam through the 4 ft. seam to the surface, and thence brought along the new skip incline, completed during the present year, and to the new screens at foot of same, thus endeavouring to put before him a short round trip over the workings of the Company's property.

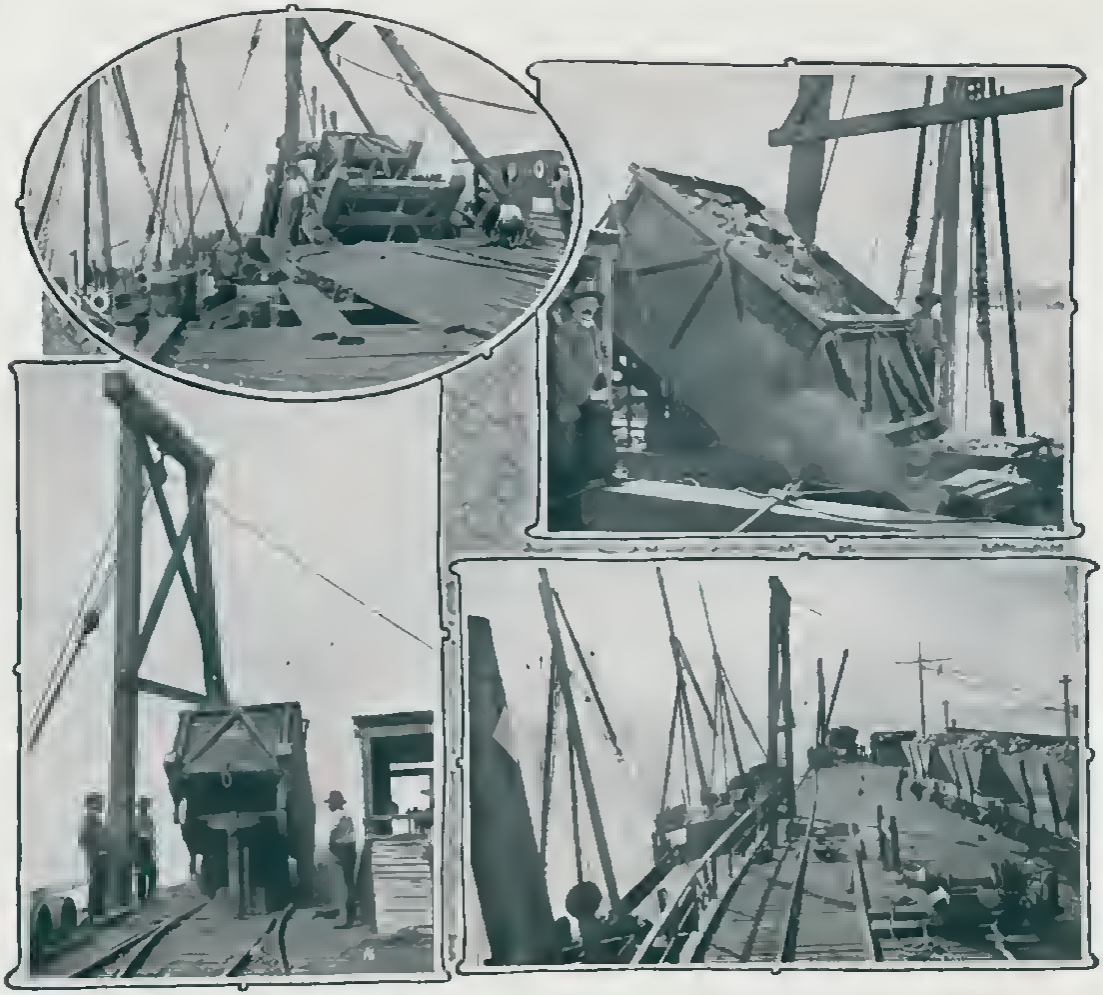
STEAM COLLIER "BELLAMBI" loading alongside the South Bulli jetty. The jetty is on the gravity principle. The loaded coal waggons are pushed to the loading place by a locomotive, and after loading, the empty waggons are shunted on to the down line and returned by gravity to the shore end of the jetty, where they are taken charge of by the locomotive and re-hauled to the mine. This jetty has been entirely rebuilt during the last three years. Starting from the shore end, all old timber has been cut out and the work made completely new. This has been carried on without disturbing the coal operations of the Company, by means of a big truss bridge arrangement by which the full and empty waggons were carried over the repairing part of the jetty while the work of renewal was proceeding underneath. The cost of this work was approximately £10,000, and during its progress, without interfering with the Company's business, over 1½ million tons of coal were hauled and shipped over the jetty.

THE UPPER left hand illustration shows the old system adopted of tipping trucks at South Bulli. It will be noticed that a portion of the jetty was swung as a kick-up, and that it and the waggon on it, which was automatically locked, were upended. The coal fell out of the forward end of the waggon, and when empty steam power was applied, the kick-up portion of the jetty came back to its normal position, and the empty waggon was then shunted on to the returning incline.

This scheme, which was in use for many years, was a heavy strain on the jetty, the concussion of the kick-up when in action proving very serious, and when the jetty was re-built a scheme was evolved to replace this, which is shown in action in the two upper photographs.

Steam rams were installed, and by the application of this power the trucks themselves were up-ended and the coal falls out of the end of them into the shoot and so on board the collier. The side and back view of this process shown in the pictures will make the reader clearly understand the alteration of the system involved, and the great saving in wear and tear, both to trucks and jetty obtained by the introduction of this scheme.

The lower right hand photograph represents a view of the end of the jetty with the big 10 ton trucks on it and the collier lying alongside it, and gives an idea of the width and character of the structure in question, which is open to the full force of the Pacific Ocean.

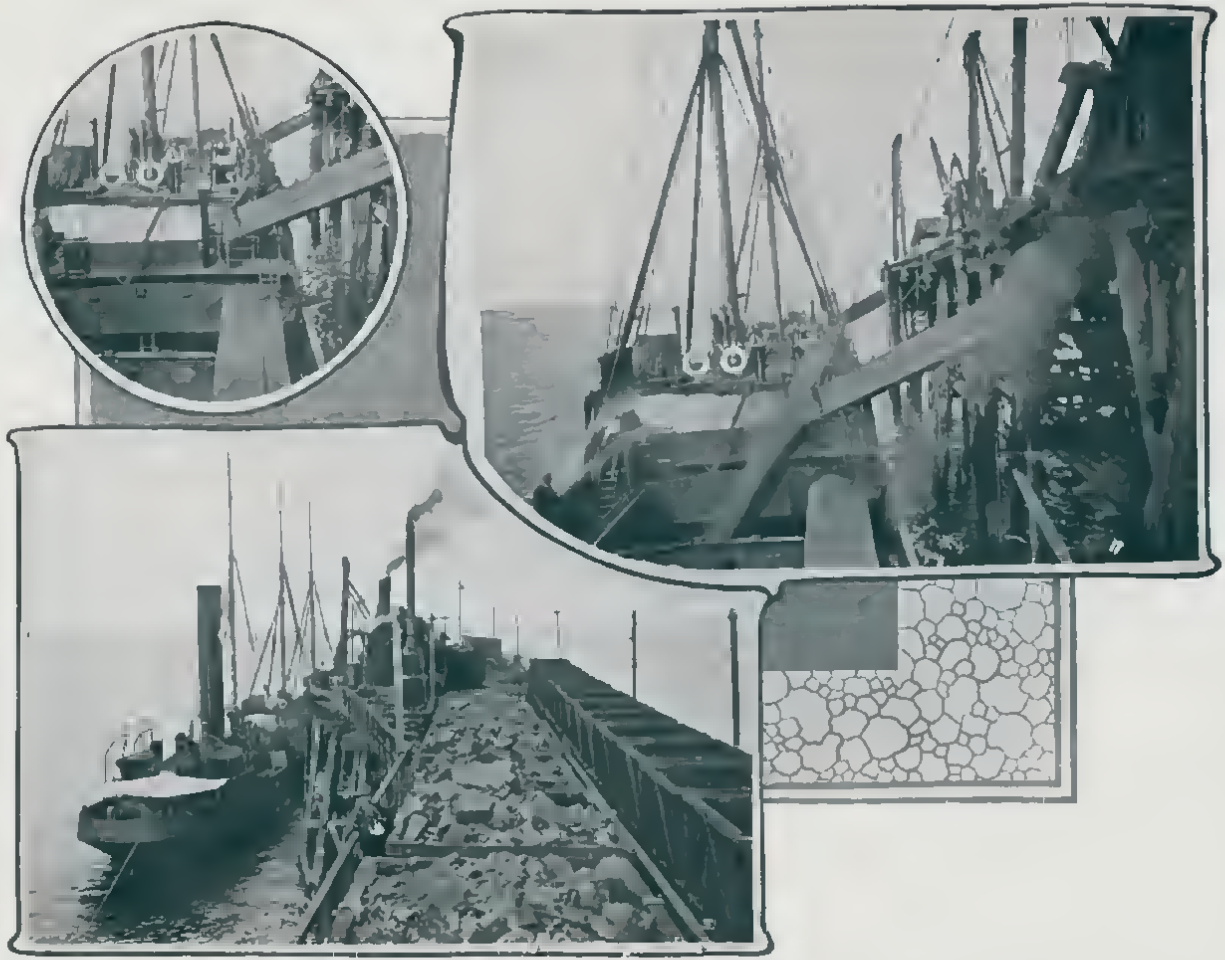


THE METHOD of tipping the coal into the shoot from the jetty having been explained, the lower photograph will show the loading in progress and the empties returning along the line, while the upper photographs will show the coal falling from the shoots into the hold of the steamer.

It will be interesting to contrast the appearance of the coal in the trucks in the lower photograph with that presented by the same coal as it runs from the shoots into the collier. The directions to Engineers will have already explained how friable this coal is, and to see it shooting into the collier's hold one would scarcely believe that it was the same coal as that seen in the trucks.

On board the collier will be seen one of the ship's hands engaged in spraying water on to the falling coal. This is to damp down the large volume of dust created by the breakage as the coal falls into the hold.

It has to be recollected that the jetty has been built high enough to load vessels up to 3,500 tons capacity and that there is a big rise and fall of tide The result is that at low tide the coal falling into the holds of the comparatively small colliers of the Company has a heavy drop and from its friable nature suffers a deal of breakage, but the installation of the rams has proved effective in considerably reducing this.



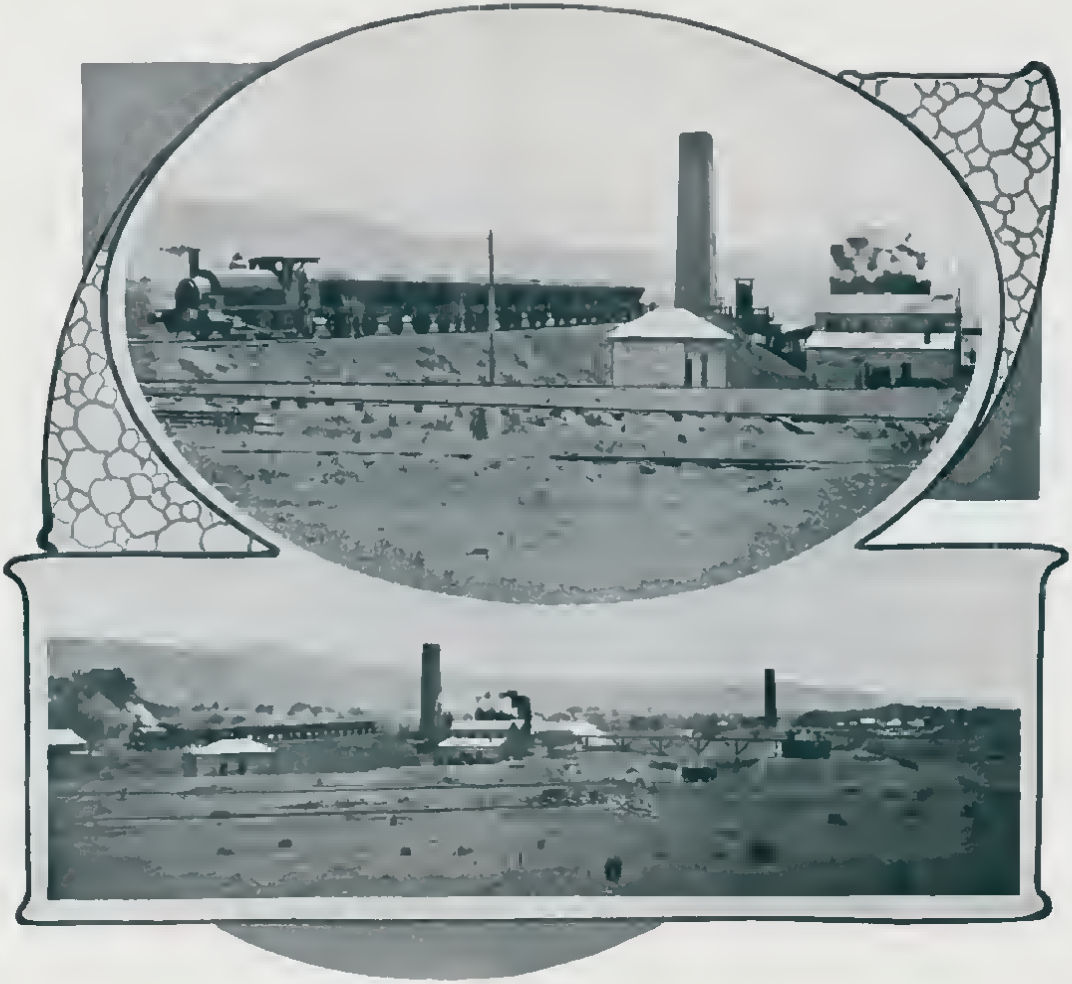
IN the left hand top corner will be found a view of the new jetty seen from the shore end and showing the truss bridge in operation, underneath which it may be noticed the jetty repairs are still in progress.

To the right will be seen a general view of the Company's sidings at the approach to the jetty. These sidings have a standing capacity of about 5,000 tons of coal, and cover 10 different lines of railways and sidings connected thereto. The view was taken on an ordinary working day, and some of the trucks will be seen stacked with small coal for shipment, some with best, and some with unscreened, and the jetty will be seen in the background.

Leaving the jetty, which runs North-East, the visitor proceeds by the Company's railway line towards the mountains, about 4 miles distant, on the slopes of which are situated the South Bulli and Bellambi mines. Turning round then and facing West, the lower photograph will show the 3 main lines of railway running from the jetty towards the Company's mining property, giving a view of the rich Illawarra flats with their palm trees and cultivated fields, and in the left lower corner a group of the jetty officials.

TURNING back for a moment before leaving the jetty a view is shown of a train of trucks being shunted on to the jetty with the steamer "Bellambi" lying alongside, having nearly completed her loading, below a photograph of the different types of locomotives employed on the Colliery railway tracks. Of these there are in all seven in use, three of the type shown to the left from the Avonside Works in Bristol, and the two smaller types of tank locomotives, which are mostly used for shunting on to the jetty where a lighter machine is required.

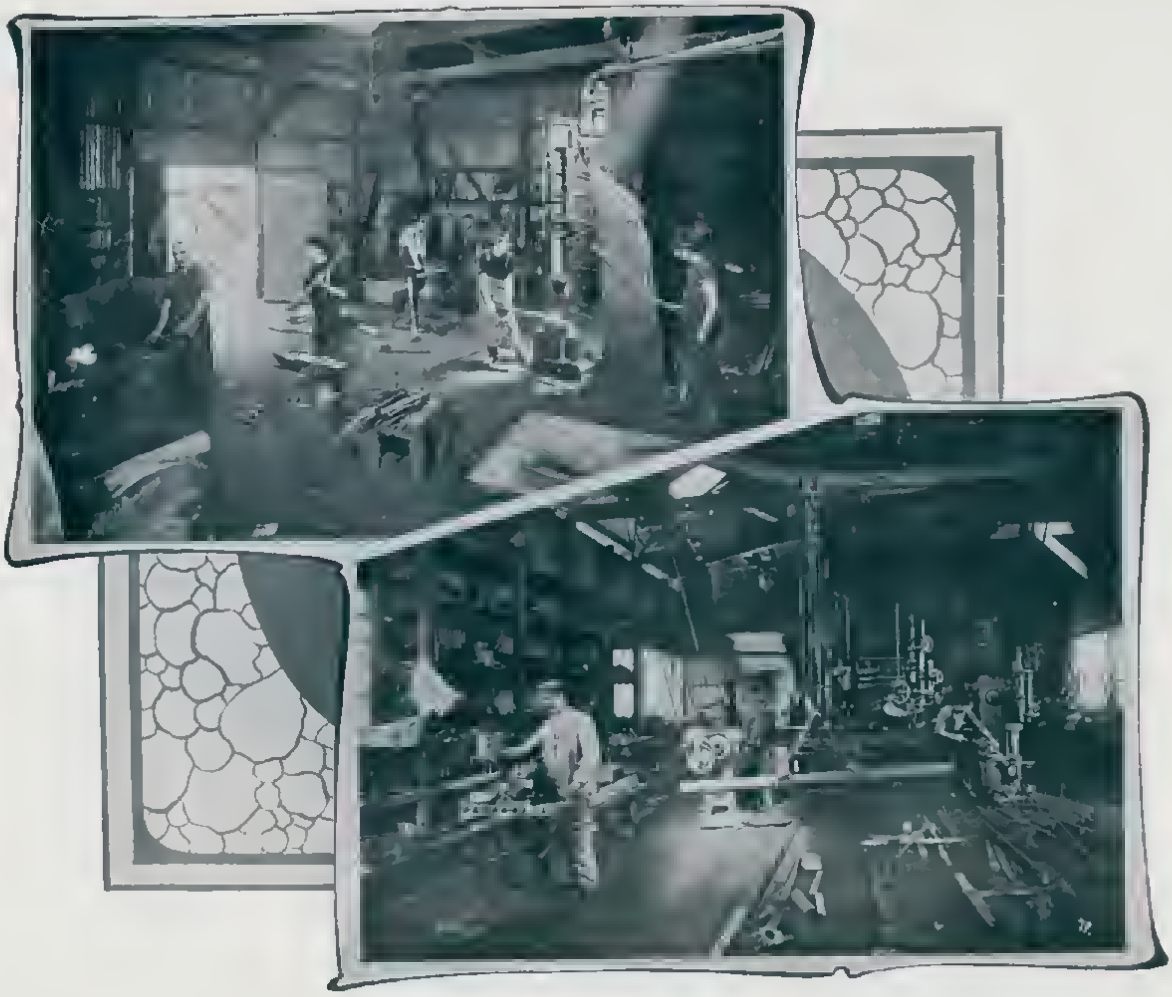
In the middle view will be seen one of the Avonside locomotives bringing a full train of 10-ton trucks to the jetty, and hauling a load, including the weight of the waggons, of approximately 300 tons, which in some instances is taken over a grade exceeding 1 in 40.



HERE is shown a view of section of the raised embankment leading to the new screens, which are seen in the background partially constructed. Also a view of the offices and workshops, which are situated at the foot of the big gravity incline, and a group of the office and surveying staff.

THE WORKSHOPS are very completely equipped with the whole of the necessary tools for carrying out a large amount of the ironwork required and complete repairs to the locomotives. A radial drilling machine of the latest pattern, planing and turning machines, steam hammer and a very complete equipment of machinery of all kinds has been provided.

The lower view represents the fitting shop and the upper the smithy; while the engine sheds are to the East of this, where there is standage room for repairs to six locomotives.

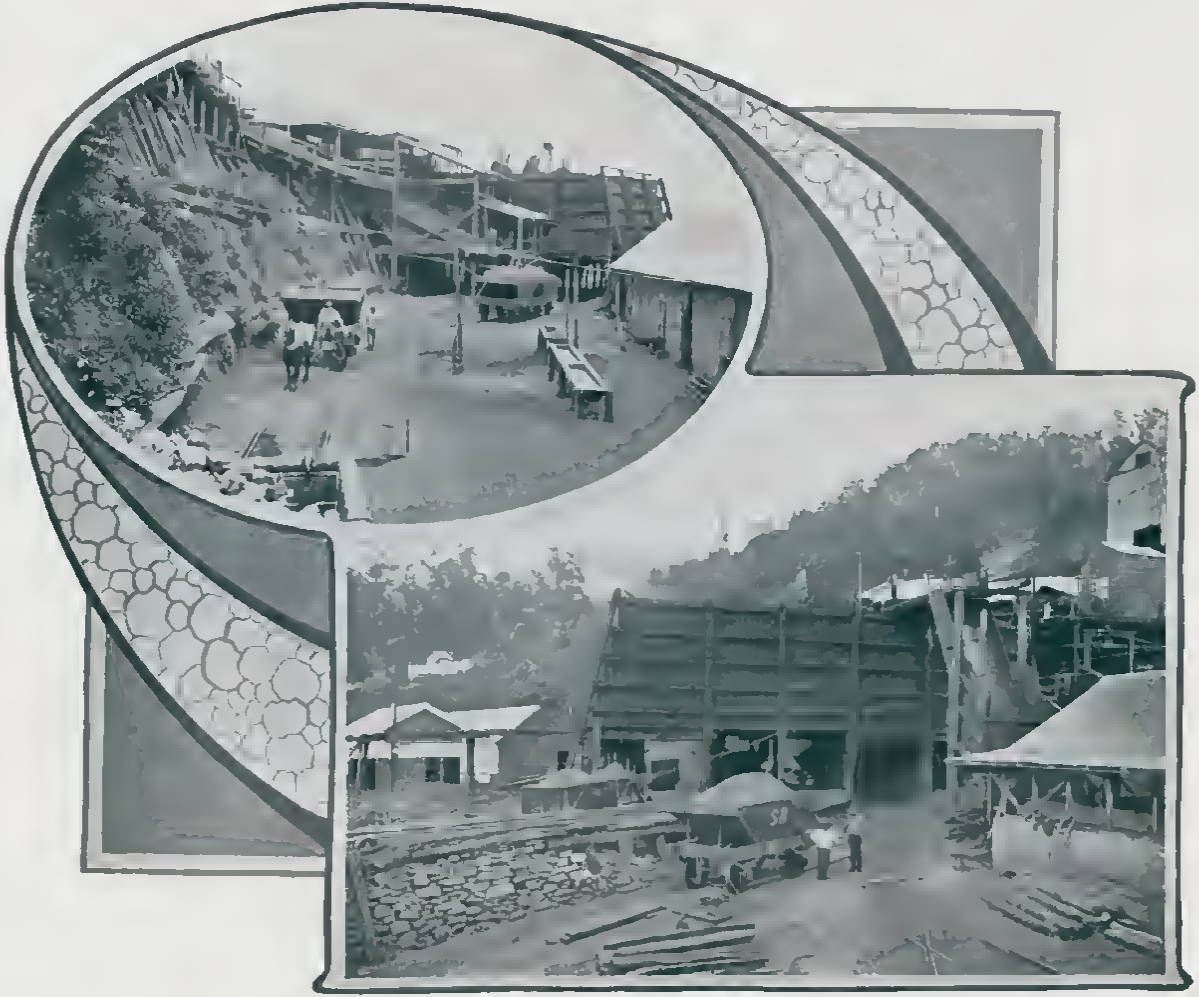


LOOKING EAST from the offices towards the mine, at the foot of the big incline, there is storage room for about 1,000 tons of full and empty waggons, and the full ones will be seen to the left of the picture and the empty ones to the right waiting being clipped on and hauled up to the pit

The upper photograph, looking West from the same spot, gives a view of a train of empty waggons being shunted to the foot of the incline, and a loaded train just leaving for the jetty.

THE INCLINE is about 500 yards long, and has a maximum gradient of 1 in 2.6. On it all classes of waggons are run, the full ones descending pulling up the empty ones to replace them at the pit top. This incline has a capacity of about 1,500 tons per day, and is shown in operation in the picture. To the right is a view of the adjoining country.

AT THE TOP of the incline are situated the main screens and small coal bunker. Here are seen two views, the upper showing the back of the screens with waggon yard behind, and shows on the right a portion of the stables where, in all, about 60 horses are constantly maintained, and the other shows the original pit top as seen from the incline. On the left are seen two full waggons of coal attached to the rope and ready to be lowered down the incline, while to the right is seen a portion of the covering of the three boilers which here operate the two main steam haulage engines at the colliery.



THE COAL is won and sent out of the mine in skips carrying about 1 ton each, and the miners who have hewn it attach to each skip a small leather label with a number known as a "token," by means of which when the coal is weighed the parties who have hewn it in the interior of the mine are duly credited on a sheet with the value of their product.

The middle picture represents one of the clipper boys hanging up a "token" after the skip has been weighed and a number of skips on the right waiting to be weighed.

The upper picture gives a view of some of the wheelers, a rather troublesome element in any pit, but, well-meaning and cheerful, and whose vagaries may be largely set down to their youth and to excess of animal spirits.

The lower photograph shows the tippling arrangement used for turning the skips over and throwing their contents over a screen, by means of which the small coal passes through the bars into waggons stationed underneath and the large coal passes over the screens into waggons.

This tippling arrangement has been found to unduly aggravate the breakage of the coal, and has since been replaced by a gravity tippler similar to that which will be shown later on at foot of the new tunnel incline.

It will be noticed that the coal on the top of the skips is in large lumps, but the body of the skip is filled with small and broken coal The miner is paid for everything he sends away, and naturally, in order to pack up his skip, fills the body of it with his shovel and packs the top with the larger lumps that he has won At the same time it is very noticeable in the South Bulli colliery that with this friable steam coal the large lumps themselves get broken up before they find their way into the holds of the receiving collier, and still more so by the time they have been discharged in baskets and dumped into the receiving vessel's bunkers in Sydney.

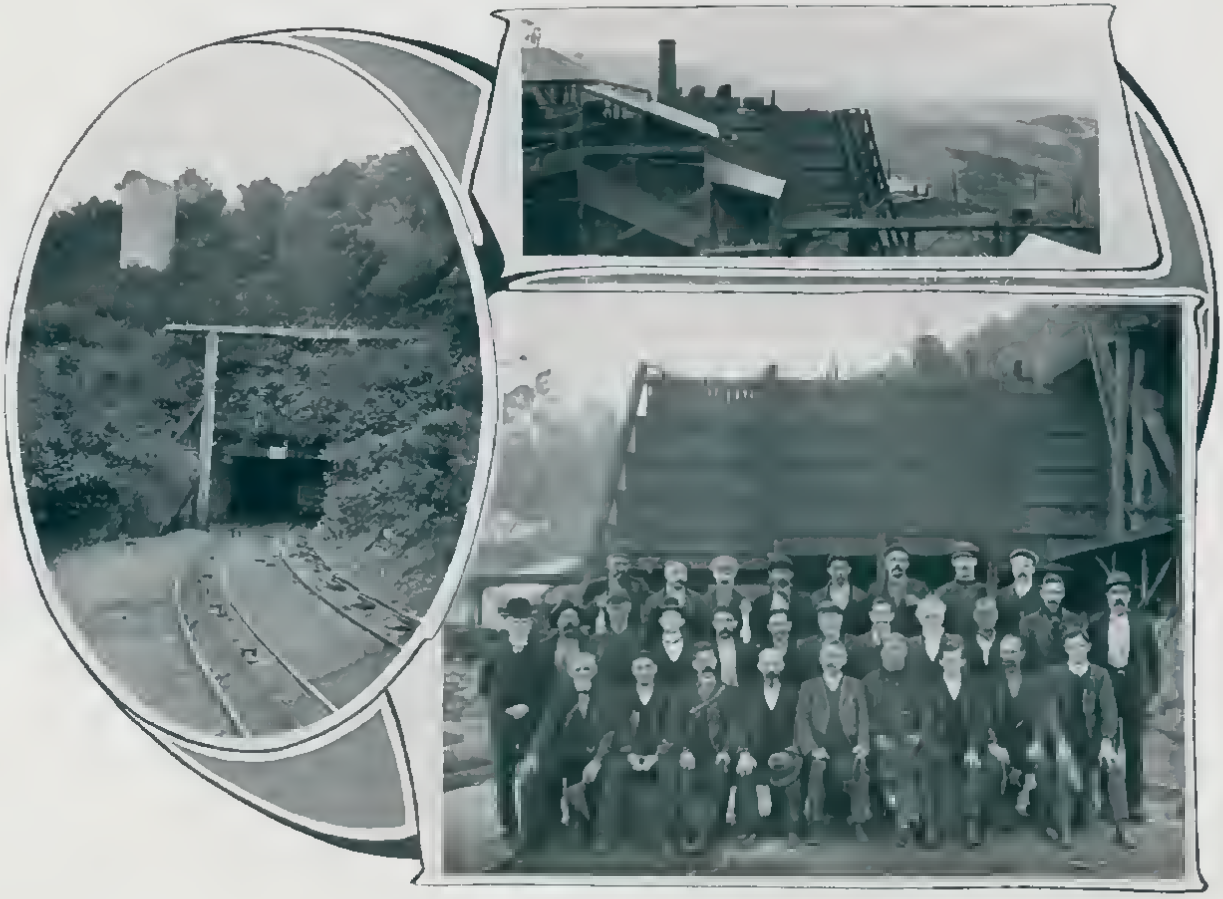
The friability of this coal, in common with most steam coals, is a source of anxiety and expense to the proprietors. On an average not less than 34 of the coal hewn by the miners has to be screened away and sold as small coal owing to the above cause.

THE SOUTH BULLI mine is under the control of Mr. A. E. O. Sellers, M.I.M.E., and a highly qualified staff of Deputies and electrical engineers, and a group of these officials is shown herewith. In the centre is Mr. Sellers, and on his right is Mr E. Davis, the Overman, who has had nearly a quarter of a century's service with the Company.

The other photograph shows the entrance to the South-West tunnel, and on the hill will be seen the old furnace shaft, by means of which many years ago, when the colliery was not opened to any appreciable extent, ventilation was carried on by a huge furnace underneath this chimney, by means of which the fresh air was induced to enter the various workings.

It is a curious fact that up to about 15 years ago the whole of the Southern coal mines were practically free from fire damp, but as the workings penetrated to a greater distance underground these conditions changed, and every mine on the South Coast is now worked throughout with safety lamps.

In the upper right hand corner is a small view of the coal bunker at the pit top.



THE OLD PIT TOP at South Bulli Colliery is seen in this view The chimney stack is connected with the 3 haulage boilers underneath the coal bunker, to which reference has already been made, and above will be seen the sheds covering the haulage engines, smiths' shops, &c. To the left will be seen the stables, and the old ventilating shaft to the South tunnel will be seen just above the coal bunker.

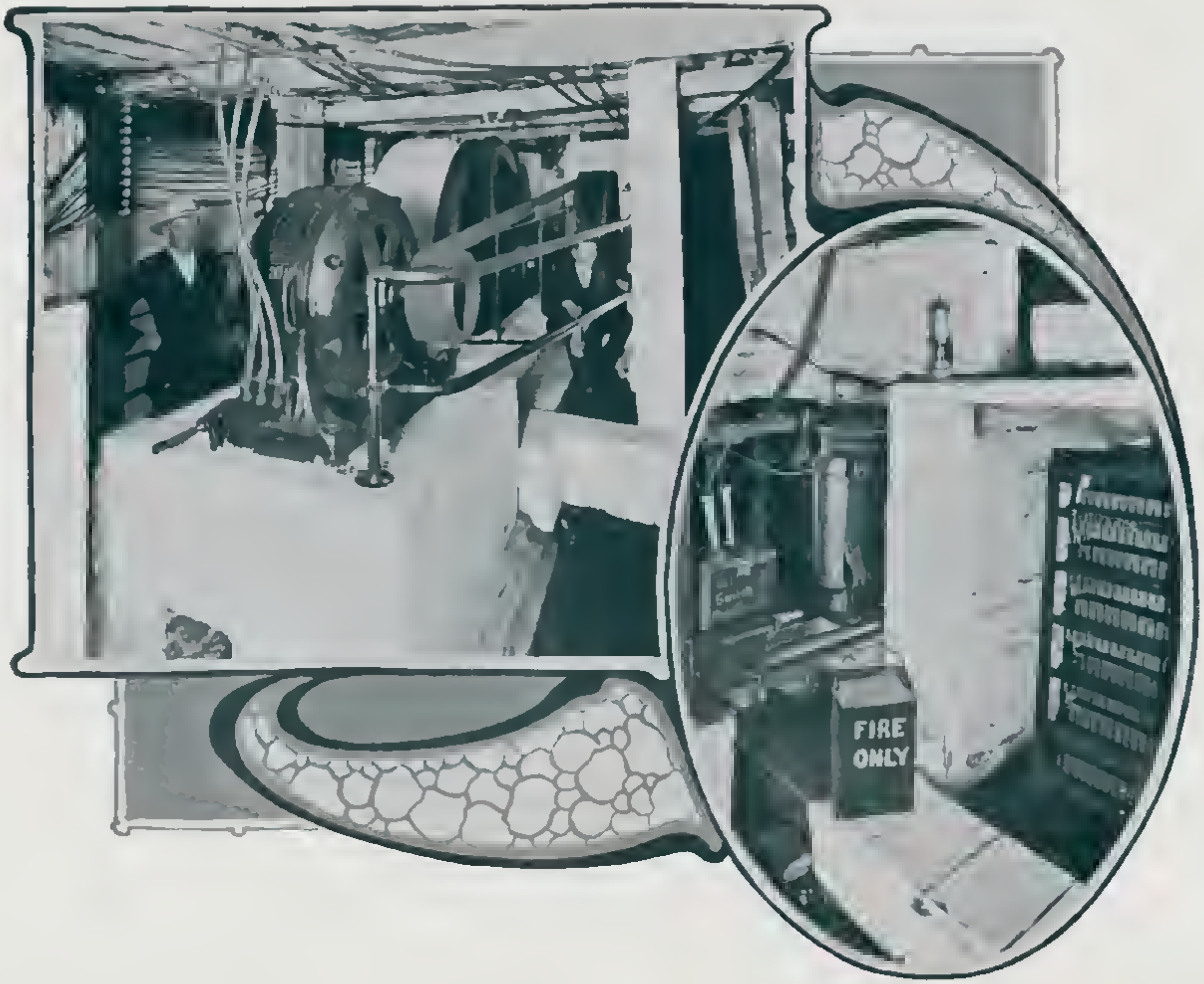
WHILE HAULAGE UNDERGROUND in the main roads is entirely carried on by endless rope, the coal from the various bords is brought to these main roads by horses, and a very interesting group is here shown of the wheelers and horses going in for the day shift.

POWER for the haulage engines is furnished by three Lancashire boilers (see top photograph) placed under the shed referred to in previous pictures, each 26ft. x 6ft., working at 70lbs. pressure, and the haulage engines, of which there are two sets, are each 200 B.H.P. driven by steam, and the one shown operates the North-west tunnel main trunk system actuating 4 miles of 3½in. circumference endless rope, which travels round the workings at the rate of 1¾ miles per hour. A similar but more powerfully geared set of engines operates the main West Tunnel (see lower picture).

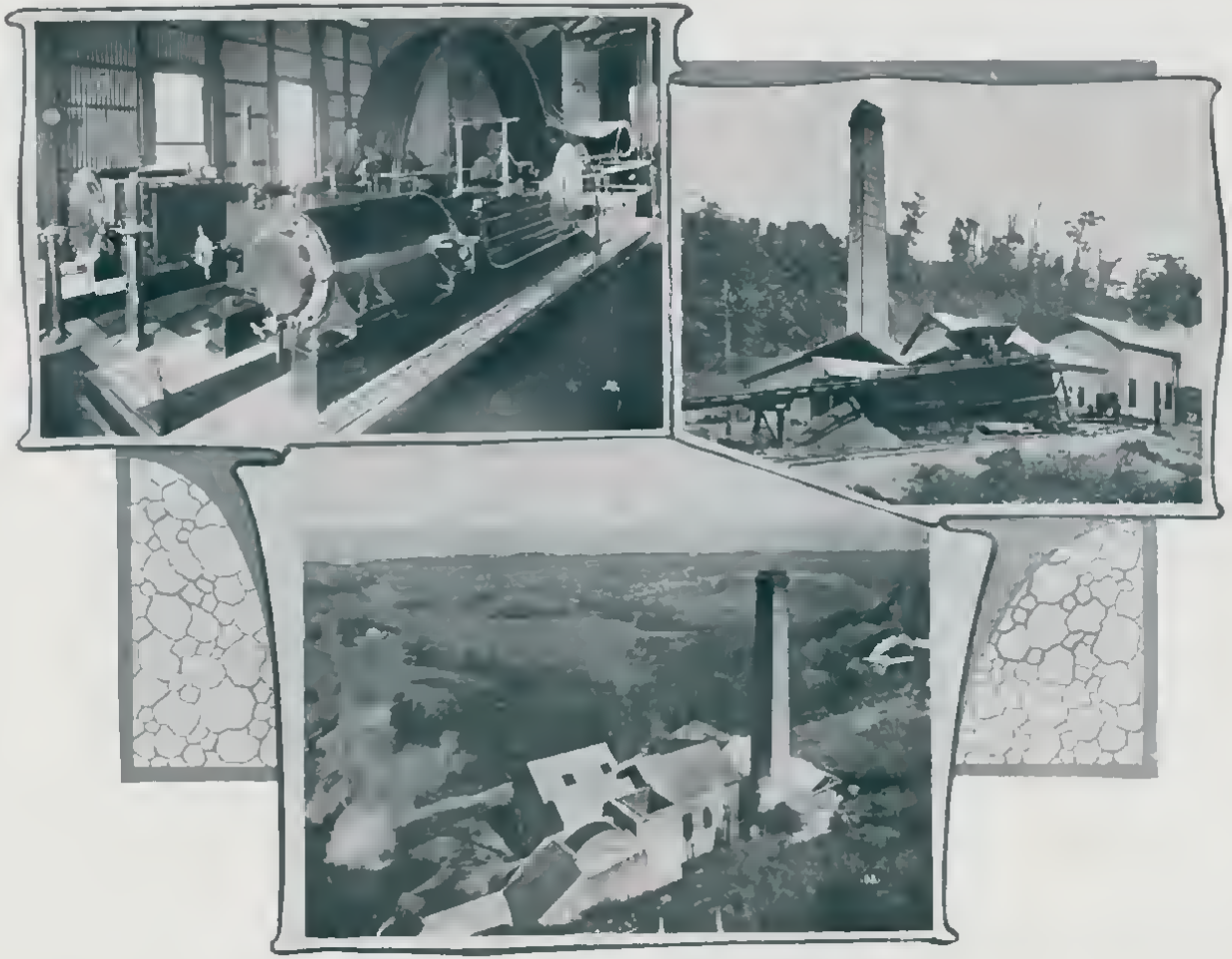
To the right of the engines will be seen a board with several voltmeter dials, which represent an ingenious contrivance for localising any breakdown in the colliery. The whole of the haulage ways are fitted with two signalling wires, and in the event of any skip running off the line or any minor accident, a rope attendant at once presses these wires together, which rings a bell in the engine-house, and this continues ringing until the obstruction is removed. The moment this bell rings the engine is, of course, stopped, and all haulage comes to an immediate standstill.

The voltmeter dials referred to are fitted with pointers which travel over a graduated scale on the dial corresponding to each working section of the mine controlled by that hauling engine, and when the signalling wires are compressed the pointer is deflected and stops approximately opposite that section of the dial corresponding to the position in the mine at which the signalling wires have been compressed, this result being arrived at by the dial standing at normal, so long as the wires are not in contact, and the flow of the current, which rings the bell, deflecting the pointer as stated.

A system of telephones runs all over the pit, so that from the enginehouse the enginedriver is enabled to ring up each section of the mine, and having ascertained from the voltmeter dial the approximate position of the stoppage, he is able to ascertain what is the cause and how long haulage is likely to be interrupted.


FIRE
ONLY

THE "HARDY" PUNCHER MACHINES are largely used for winning coal in narrow work or exploring headings, and the power for them is furnished by an electric motor-driven Reavell air compressor supplying compressed air to the puncher machines, and this compressor is water-jacketed and kept cool by a circulating centrifugal pump This Reavell air compressor is in connection with No. 5 sub-station.



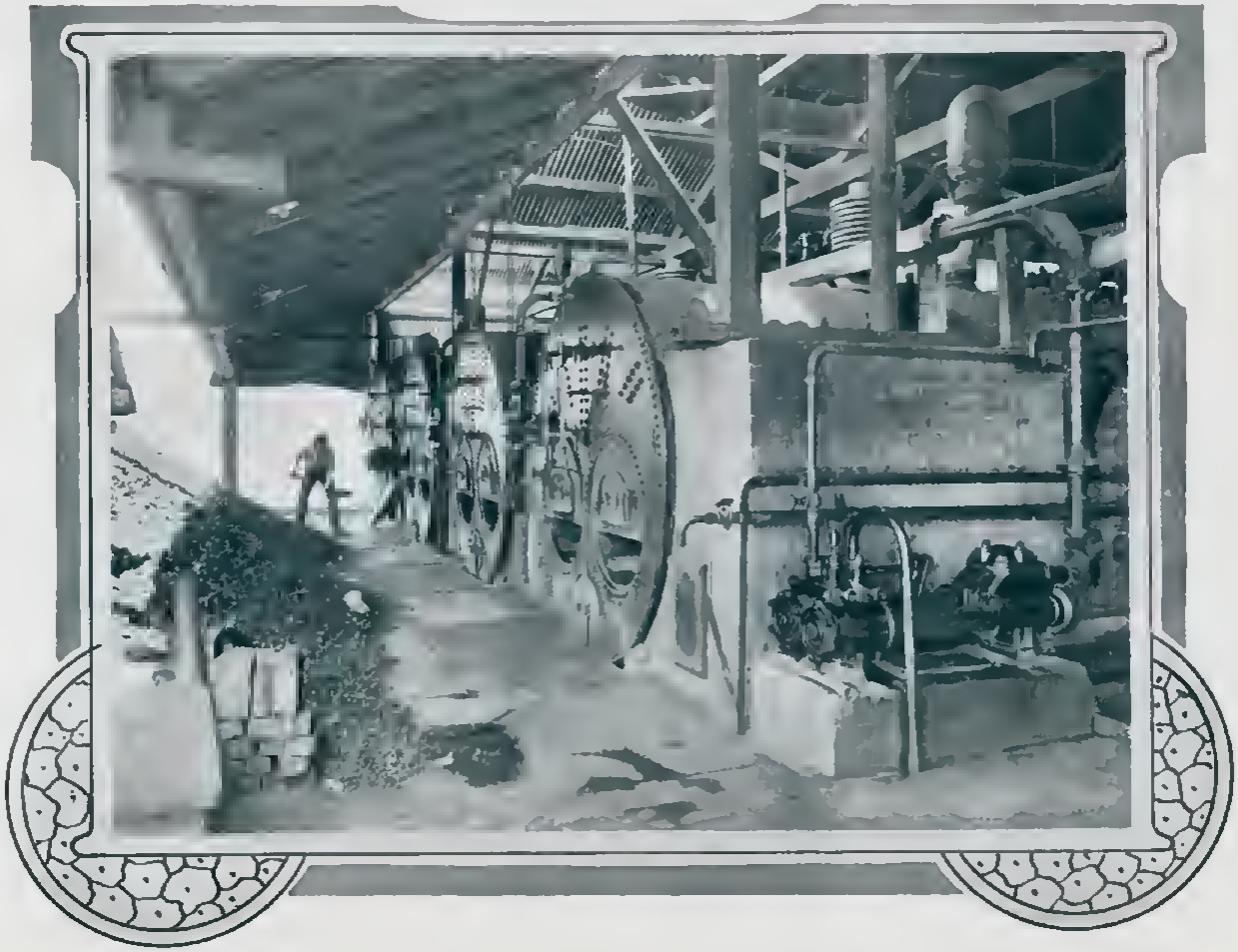
RETURNING from the fan site, the visitor entering the colliery is first of all taken to the lamp room, and having left his pipe and matches in charge of the overman, he is furnished with a safety lamp.

The lamp room is fitted with machinery by which the lamps are cleaned, filled, and made ready, and some 650 of them are in daily use at the mine. After being lit, these lamps are sealed with lead plugs which it is impossible for the miner to remove without detection, and should any lamp go out, special lighting stations are provided in various parts of the mine to meet such a contingency.

THE NEXT PICTURE shows the main entrance to the South Bulli Colliery, the tunnel to the left being the travelling road by which the men and horses enter and are able to proceed to their work without using the main tunnels in which the haulage operates; also on the right a view of the main haulage entrance.

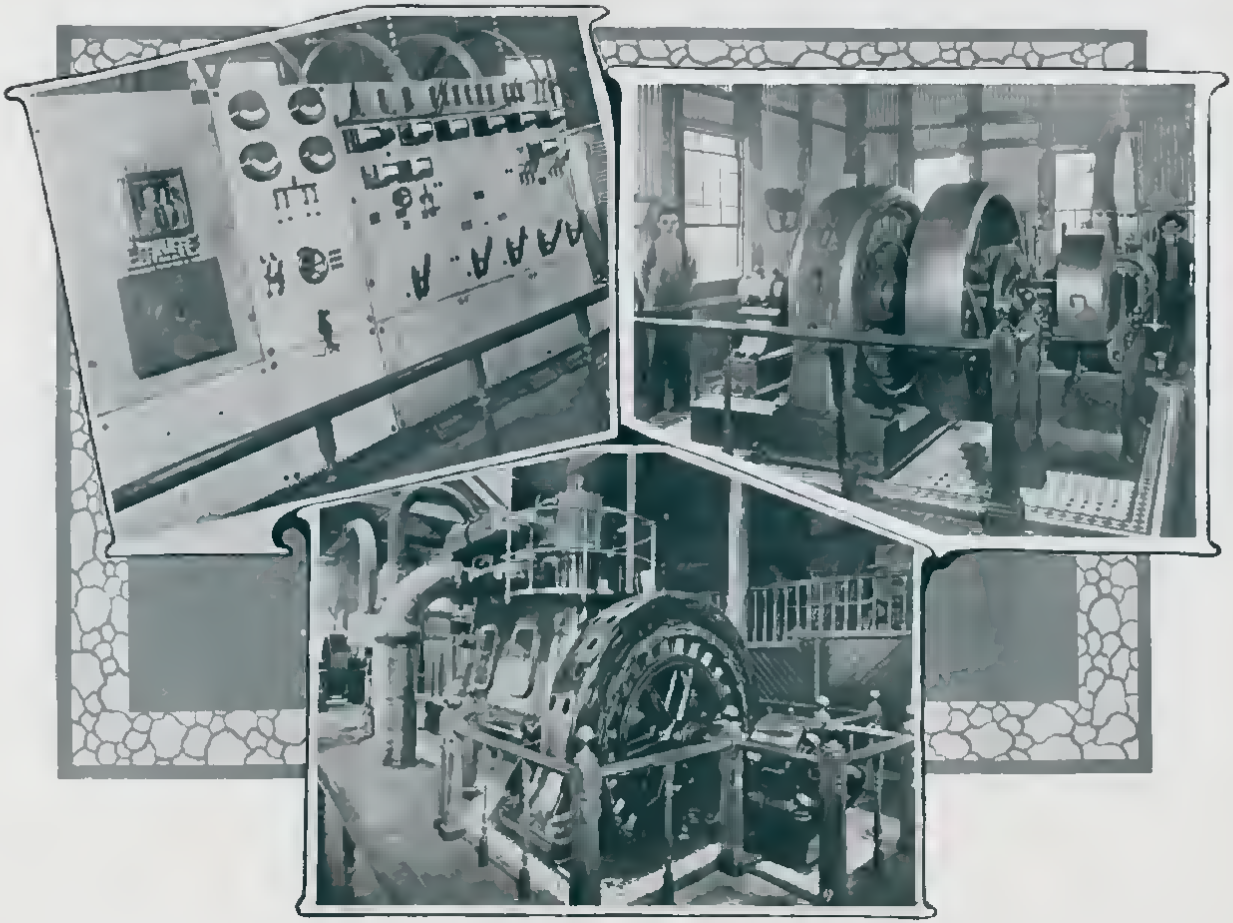
In the last photograph the empty skips going in by the endless rope and the full ones coming out are portrayed.

This main entrance for a certain distance serves both the main West and North-west tunnels.



INSIDE the main power house is seen in the lower picture the 350 K.W. Siemens-Belliss 24 pole, 2,300 volt, 60 cycle Alternator, which supplies current for the whole of the electrical purposes of the mine, and which is supplemented by a 105 K.W. Harrisburg engine (to right) driving a General Electric Company's 28 pole, 2,300 volt, 60 cycle Alternator.

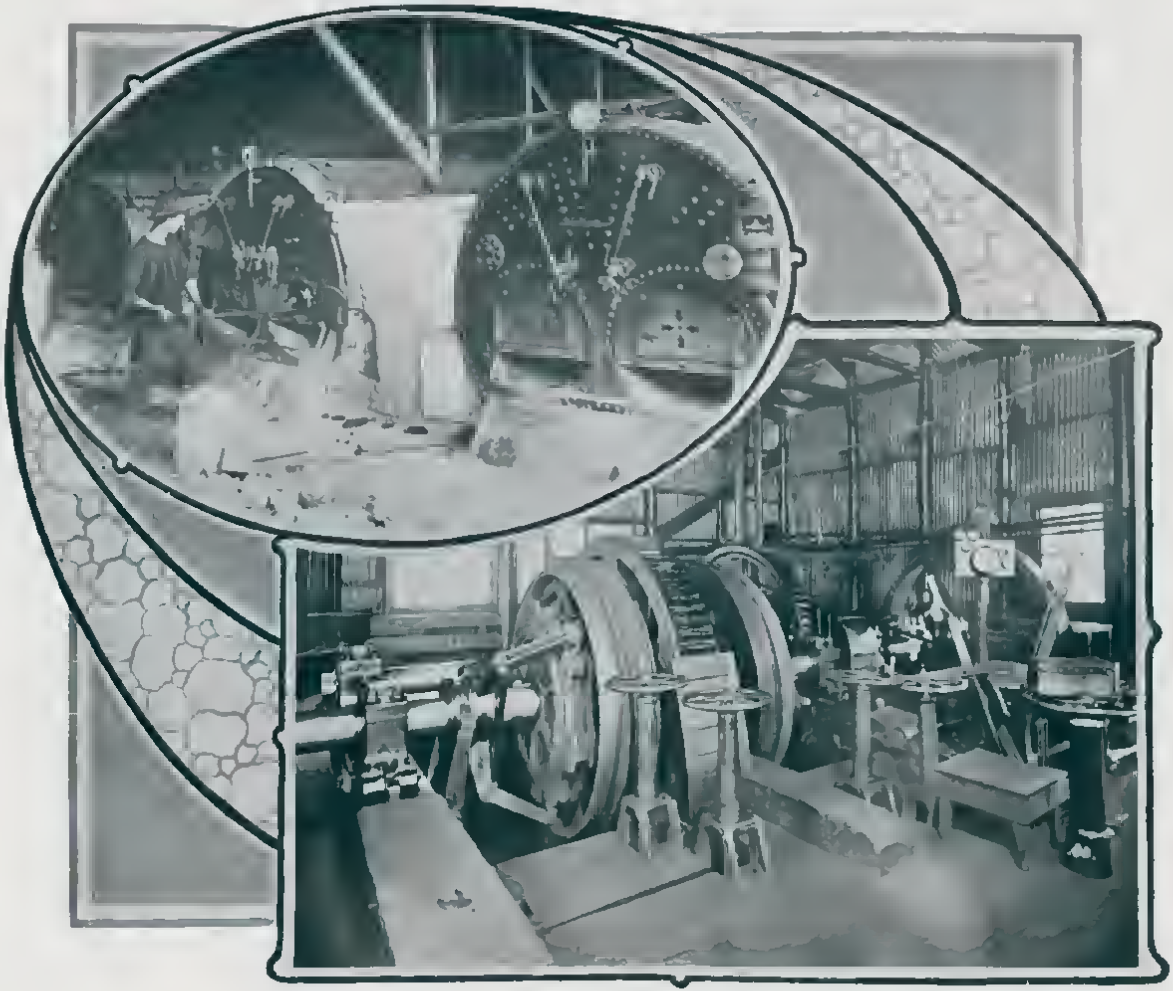
A view is also given of the switchboard in the power house, showing the panels and generators of both Alternators, the feeder panels, and the Tirrill Regulator in the foreground. This latter is an ingenious contrivance by which the voltage of the system is automatically regulated



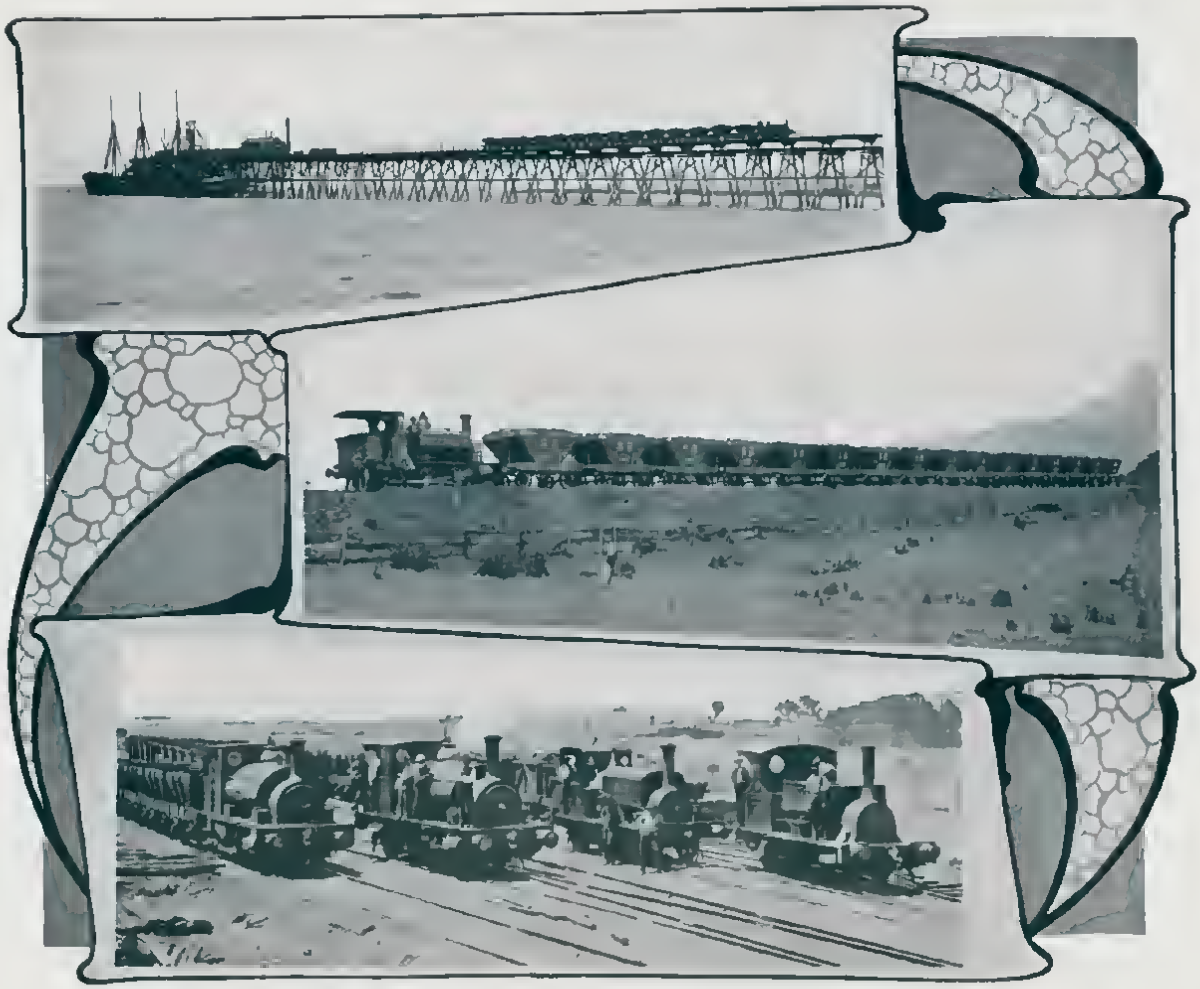
THE POWER HOUSE also contains what is believed to be the largest ventilating plant in the Southern Hemisphere, consisting of a ventilating fan from Walker Bros., of Wigan, with a diameter of 26 ft., driven by engines of 600 H.P., and with a total capacity of 560,000 cubic feet per minute against a 6 in water gauge, the power from the big driving wheel being connected direct to the shaft of the fan by a series of cotton ropes clearly seen in the illustration.

The coal for the boilers is fed by a bunker at the back of them, and a view is given of the chimney stack of the boiler shed and the coal bunker with a waggon of coal about to be tipped, the power house being seen in the background.

The situation of this power house is 600 ft above sea level, and below a bird's-eye view is given of it which shows to the left the cased-in fan itself and the low, square chimney through which the foul air is discharged, and gives a general view of the character of the country between the top of the mountain and the sea. The Company's railway can be traced running down to the jetty on the left of the picture; while, on the right, is the thriving village of Woonona, whose prosperity practically depends entirely on the colliery. On the extreme left will be seen the new skip incline, to which later reference will be made, and which, at the time of the picture being taken, was only in process of construction.



LEAVING THE OLD PIT TOP and turning to the right and ascending about 80 feet we arrive at the new main electrical and ventilating station of the colliery, erected some 5 years ago. The power driving the whole of this plant is furnished by a boiler battery, consisting of four Lancashire boilers 30 ft x 8 ft. working at 120 lbs. per sq. in. Another of these boilers will be fixed in position before this book is in print, and provision has been made for a sixth, which will be installed within a few months. This will give an approximate energising power of 1,600 B.H.P. In the foreground will be seen a section of the Weir feed pump, which supplies the boilers with water heated to about 200 deg. by the waste steam.



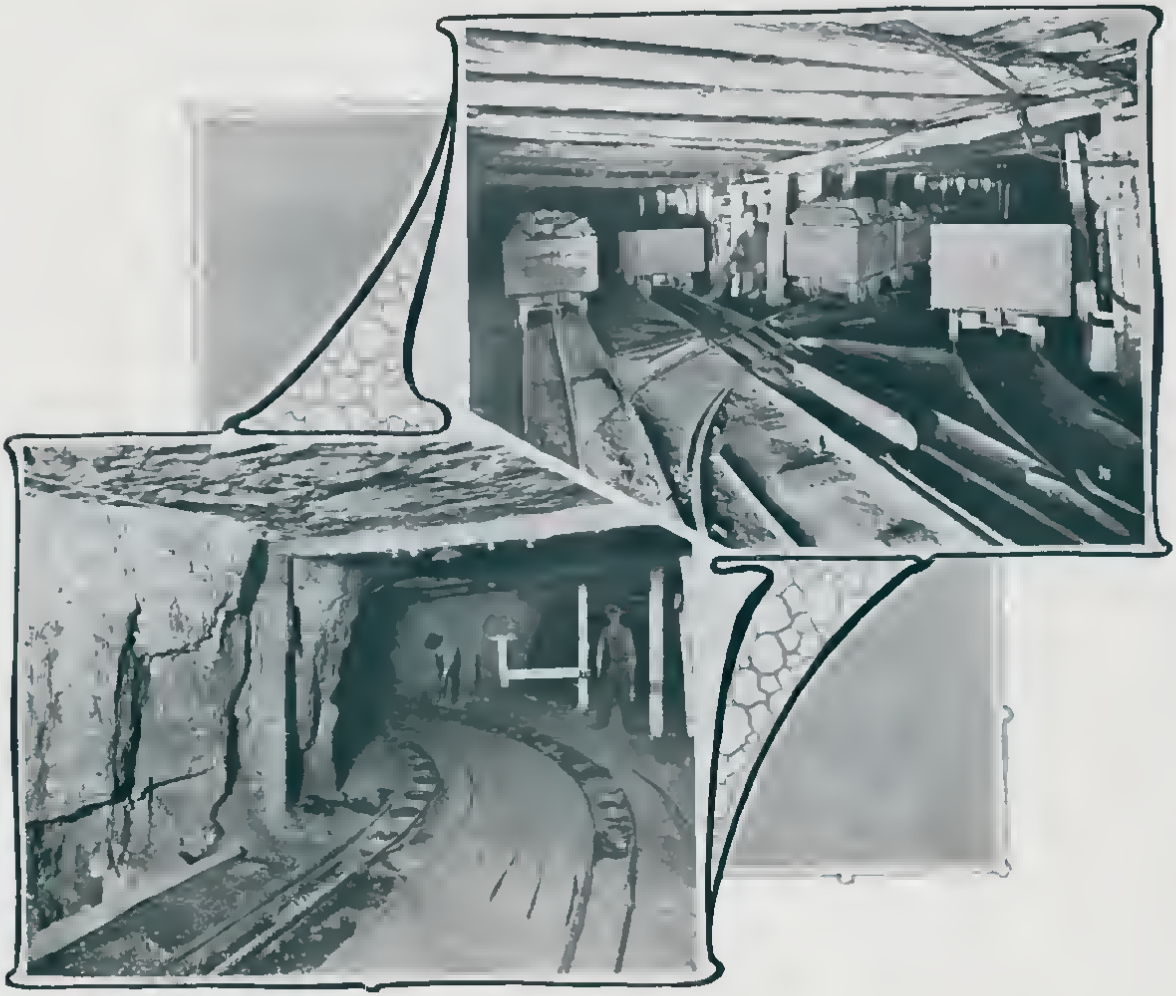
PROCEEDING up the line, the Main Southern Railway line is crossed about one mile from the jetty, and immediately on the right, as the visitor proceeds towards the mine, are situated the big coke works of the Broken Hill Proprietary Co., Ltd This Company purchases about 80,000 tons of small coal annually from the Bellambi Coal Co., Ltd., which is turned into coke without any preparatory treatment by washing, and as this coal is the direct screening from the large, it speaks volumes for the quality of the material and the absence of intrusive foreign matter. The works consist of 120 ovens and put out on an average 250 tons of coke per working day. The upper picture will show another view of the works with the Bellambi Coal Company's locomotive shunting in a train of small coal, which is tipped into the big bunker shown in the picture, and thence conveyed automatically to the grinding machines preparatory to being delivered to the ovens for coking purposes.

THE first underground subsidiary electrical haulage station is situated 1,000 yards from daylight, and is the first electrical haulage gear installed underground in any Australian coal mine.

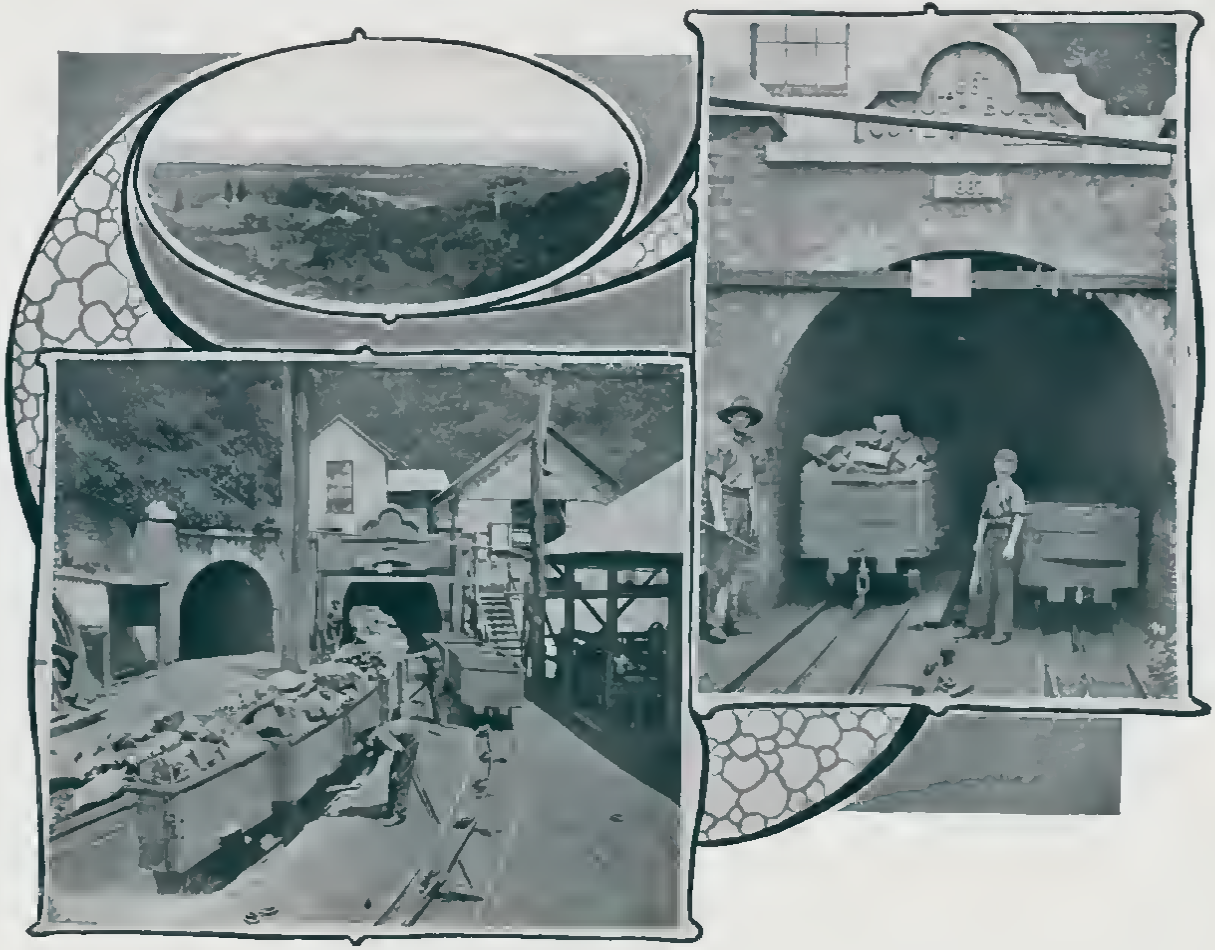
The power for operating this, and the numerous other power stations, pumps, &c., underground is furnished from the electrical power plant and conveyed by cable laid under the floor of the drive.

Special attention has been given to this cable. The whole of the electrical power is developed on the 3-phase (alternating) system. The cable itself is not only thoroughly insulated, but is sheathed with lead, jute covered, and again sheathed with steel plating, so as to prevent any accidental dropping of a pick or tool injuring the cable; lastly, it is sheathed with a special composition and thickly covered in bitumastic, so as to ensure its being waterproof. The cost of this cable exceeds £750 per mile. Its course in the mine is marked by a broad white line on the roof, corresponding to the position of the cable under the floor, with frequent notices warning miners to use great care in regard to it; but, as a matter of fact, no accident has ever arisen in the colliery through any electrical appliance, largely owing, no doubt, to the extreme care bestowed on the installation, which, in every respect, is up to the highest requirements of both the British and Australian mining Boards.

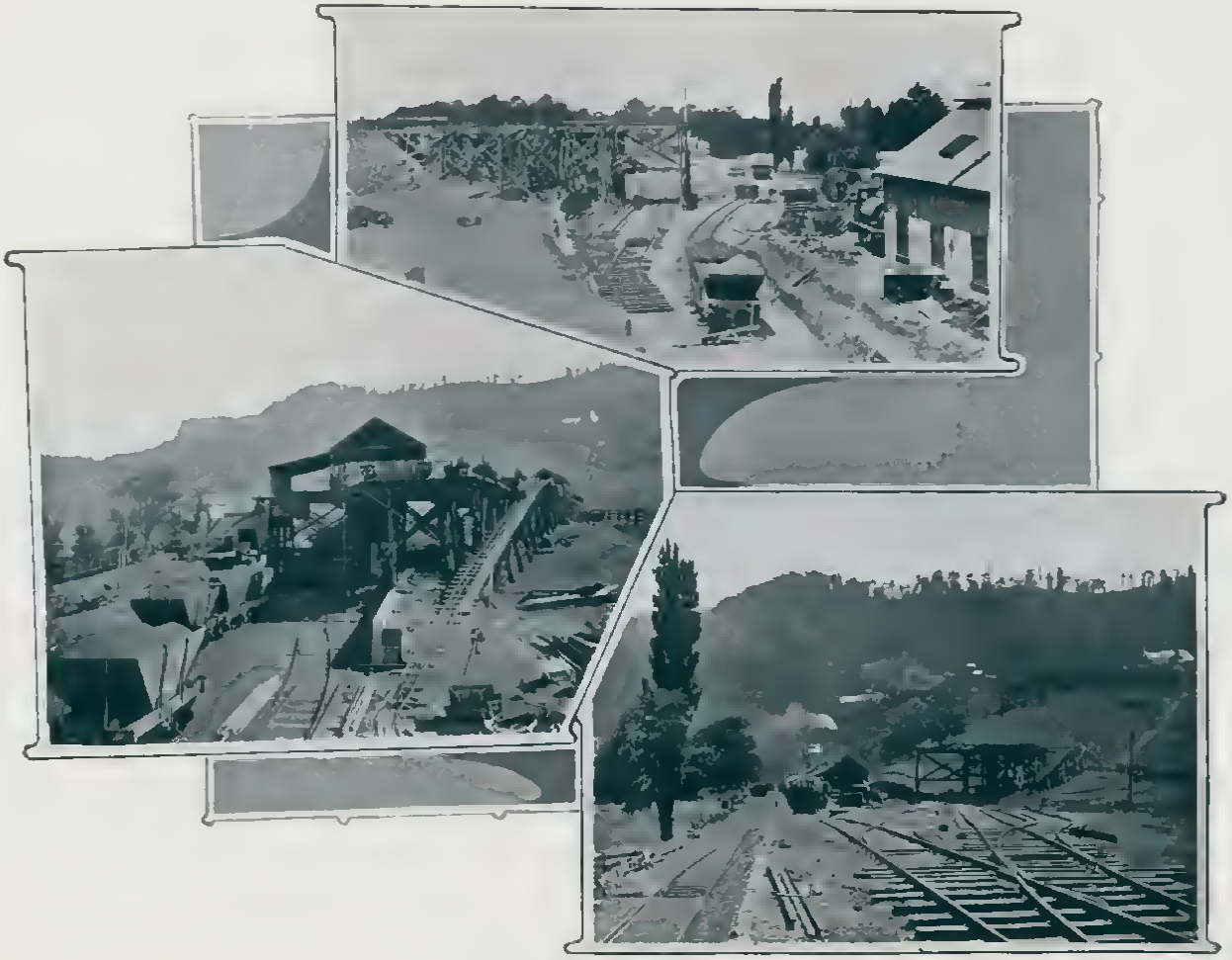
This No. 1 electrical haulage consists of a 20 B.H.P. Alternating current motor, belted and geared to an endless rope, as shown in the picture, the current at 2,300 volts being transformed underground into 220 volts, and the resistances and transformers are also shown in the right hand picture.



A SECTION of the new main West tunnel is here shown about 1,000 yards from daylight, where, owing to a crush, a drive had to be taken right through the rock over the seam and then gradually taken down to the coal beyond the troubled country. The heavy character of the work will be fully appreciated



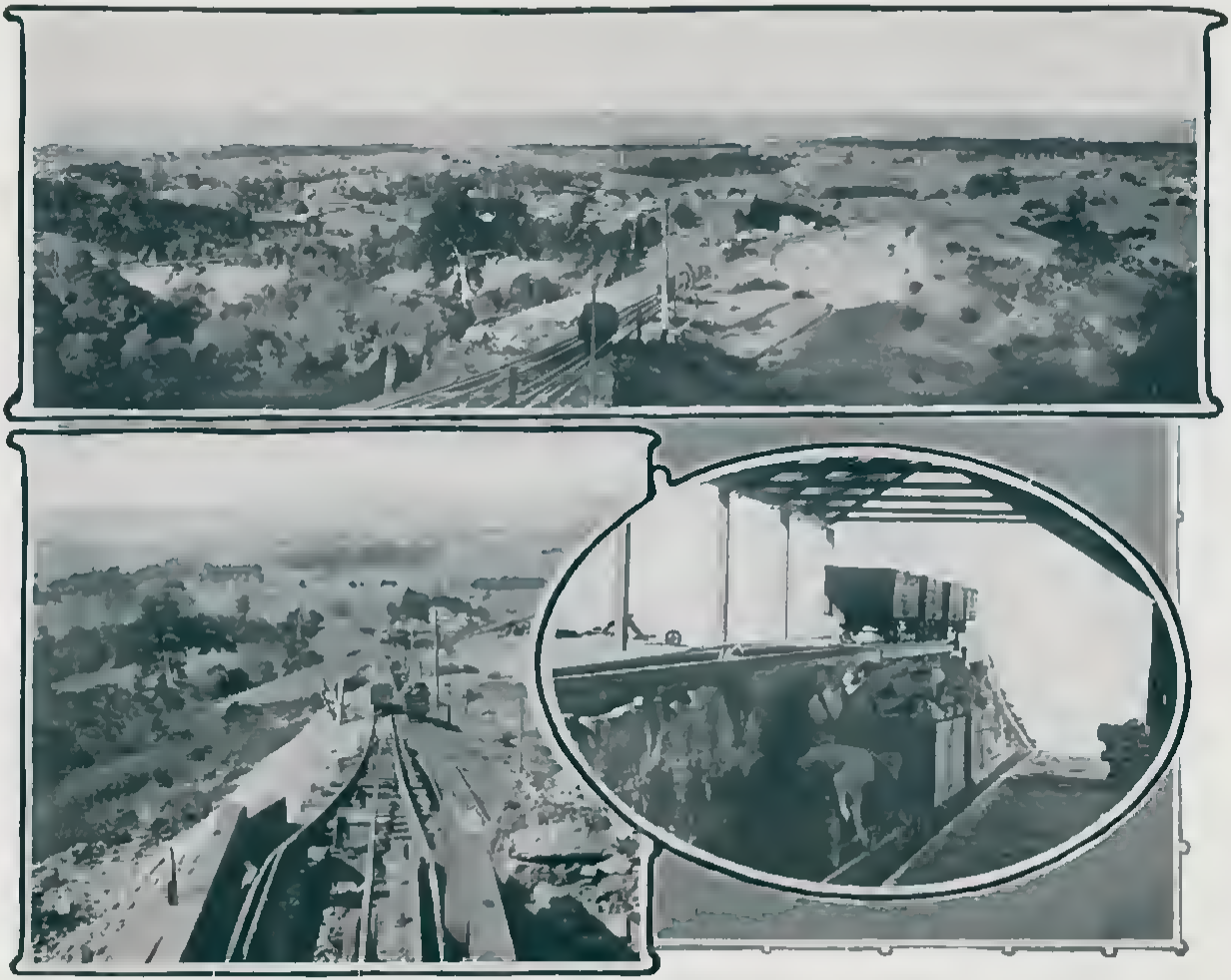
HAVING ENTERED the mine by the travelling road and sat down for a short time in order for the eye to get accustomed to the darkness, the visitor proceeds along the road until he arrives at the junction of the No. 1 electric haulage road with the main North-west plane, where the coal is fully nine feet high, without seam or band. The system of carrying the endless rope haulage round a large number of wheels known as "Tommy Dodds" is shown in the lower picture. These wheels are on self-oiling brackets and are regulated at the proper level so as to economise the friction and prevent the rope jumping off the rollers.



HERE WE HAVE another view of the screens in operation, the large and small coal being shown in the sidings, and a portion of the timber stack to the right, and a view of the empty skips after discharging at the tipplers clipping themselves on to a chain and being dragged into a position to be re-clipped.

The gravity tippler is shown at work. It will be noticed that it contains three skips, and the man is in the act of tipping one of them at the time of the photograph being taken.

The big tippler revolves slowly to the left and very gently deposits the coal on the screens below. As it does so, the skip at the top, which has automatically kept in position, goes into the place formerly occupied by the full skip and is shunted out by the operator, from whence it takes charge of itself and by gravity runs to the hooking-on arrangement already mentioned.



THE SCREENS at the new tunnel are a very complete piece of work, furnished with revolving gravity tipplers, and have a capacity of about 1,200 tons per day.

On this page is shown firstly a view of the screens looking East, and taken from the back of the new offices, showing them in process of construction, and showing the construction of the necessary siding works to operate in connection with them, while in the right-hand lower corner will be seen a similar view looking West. The finished screens in operation are also shown, and to the right of them will be noticed a small incline which is used to convey pit timber stacked at the foot of these screens, and which is furnished with subsidiary power from the incline, so that when the skips are loaded they are taken from the timber stack right into the mine without further handling.

THE INCLINE which conveys the coal from the new tunnel driven through the 4-ft. seam is on a different principle to the big incline operating the main West and North-West tunnels, for whereas in the latter the full waggons are run from the screens direct to the railway, in the former the skips of coal are taken after being weighed at the pit mouth and travel right down to the bottom of the incline and the screening takes place there.

The system of working this incline is partly by gravity, but the ropes travel at a uniform rate of about one and-a-half miles per hour controlled by the haulage engine operating the tunnel, and the surplus power derived through the weight of the coal on the incline is used to assist in driving the electric haulage engine, which thereby receives the benefit of about 35-h.p. when the skip incline is working

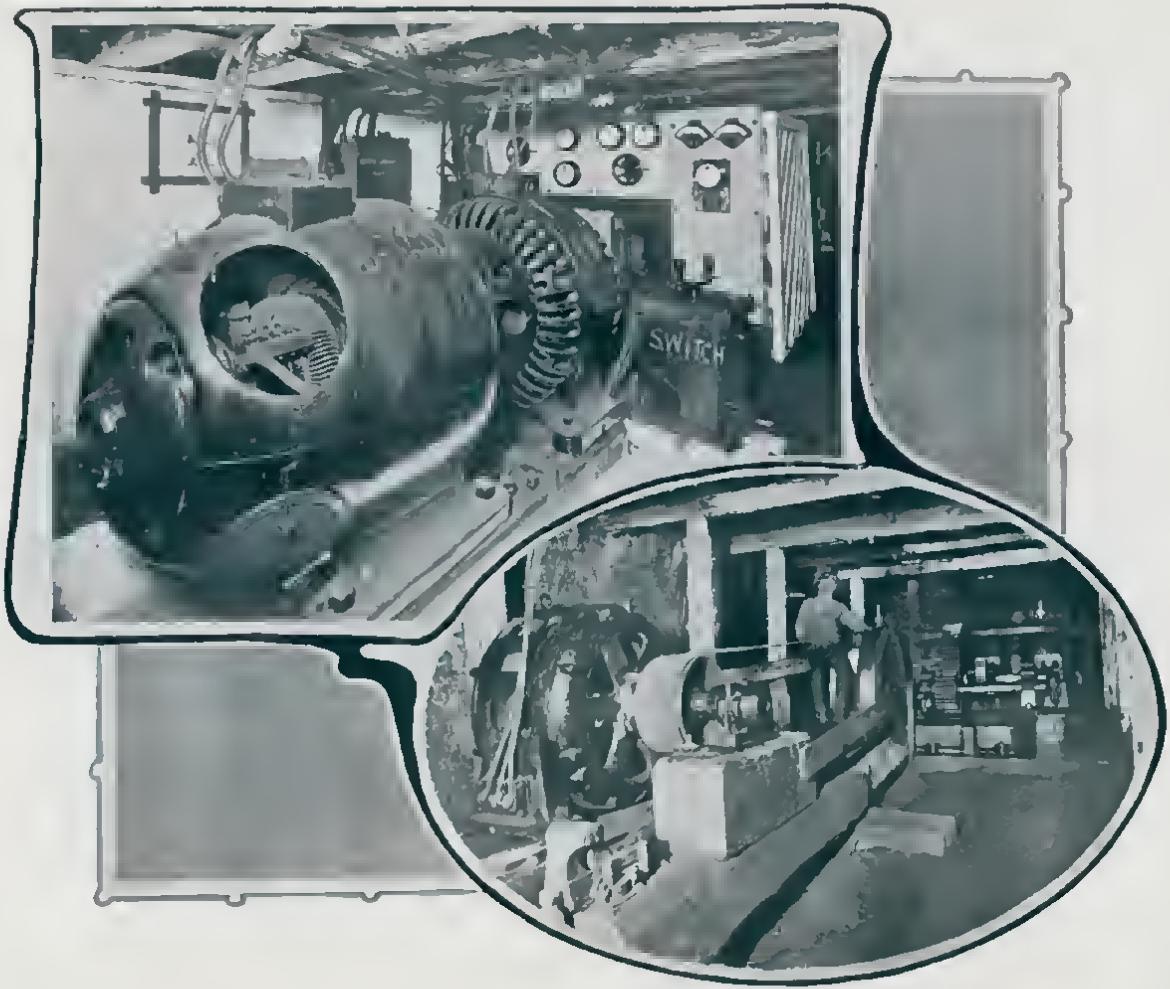
A view is here given showing the incline in operation and the full skips travelling down and the empty ones coming up towards the top, and another picture shows the skips coming over the bank head and in a position to travel by gravity to the point at which they are clipped on to the rope and go into the mine.

These skips are attached to the rope by an ingenious form of clip which as long as there is a strain through their being pulled up hill keeps them tight on the rope, whereas, as soon as they come over the pit bank, as shown in the picture, and proceed to run towards the mine, these clips automatically detach themselves.

In this picture will be seen a lad clipping on the full skips on the lower road preparatory to sending them down the incline.

The upper view is a general view of the country between the mine and the jetty.

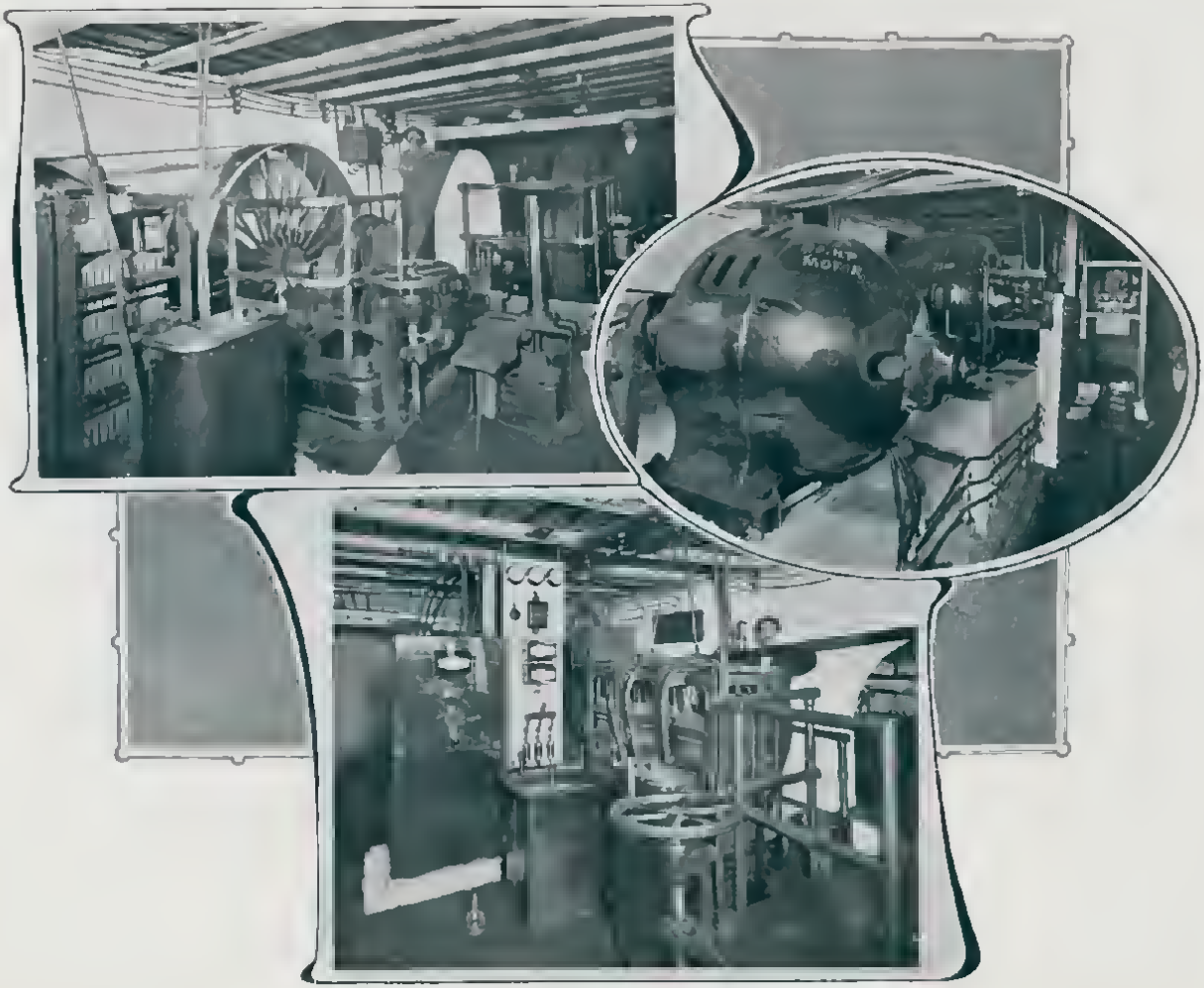
HERE IS SEEN another view of the works in progress at the new tunnel, where retaining walls are being made and foundations put in for the electric haulage, while another picture shows a bird's-eye view of the sheds covering the new electrical haulage when completed, looking down the new incline towards the sea, and another view looking in the same direction, showing the formation of the new incline before any work had been done at the top of it.


SWITCH

HAVING VISITED the various sub-stations underground and inspected the machinery, the visitor can now come out of the mine by the new tunnel driven through the 4-ft. seam about thirty feet below the main seam, and which was carried up until it met the main 8-ft seam of coal, the exit being shown in top left-hand picture.

The right-hand picture shows the point in the mine where, leaving the 8-ft seam, the main drives descend underneath it, and through the country rock towards daylight, issuing therefrom at the mouth of the new tunnel shown above, the brickwork at the face and the retaining walls being at the time of the photograph in process of completion.

Another picture on the left-hand lower side of the page shows the fan site to the left, above the 4-ft seam, the new tunnel before it was in work, and the foundations for the new electrical haulage engines at the mouth of it. This scheme was only completed and work of coal winning started in May of the present year.

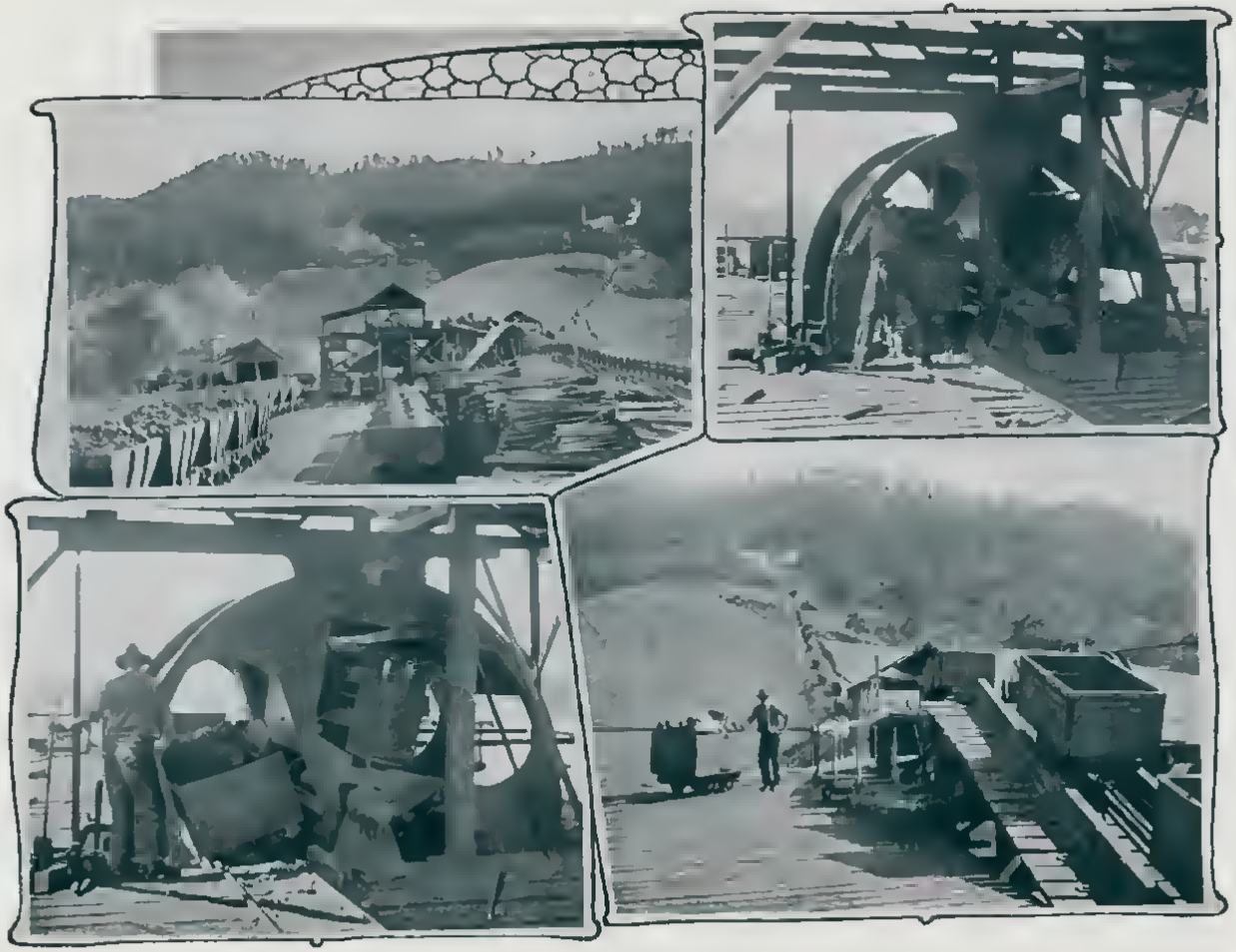


AT another sub-station, 1¼ miles from daylight, will be found a 74 H.P. alternating motor, direct coupled to a continuous current generator, which supplies current to the electrical coal-cutting machinery. This machinery is of the American Jeffrey type of breast machine, and at this same sub-station will be found a 30 B.H.P 3-throw pump and motor, which delivers 300 gallons of water a minute against a 260 ft. head This pump and motor are shown in the lower photograph.

NO. 5 SUB-STATION is situated 2,200 yards from daylight, and is an important power station. One of our pictures shows the two motors, one of 100 B.H.P. and the other of 75 B.H.P., the first of which drives the Reavell Quadruplex Air Compressor already referred to, and which supplies 358 cubic feet of air per minute at 70 lbs pressure per square inch. The 75 B.H.P. Motor operates the endless rope haulage gear, and this sub-station has in all a capacity of 180 K.W., and in addition to the haulage and air compressing, supplies current for pumping motors, and also furnishes power for the electric lighting system in the territory traversed by the haulage ropes.

The endless subsidiary rope haulage driven from this station, and shown at the top of the page, operates five miles of rope at a speed of one and a half miles per hour, this system feeding the main steam trunk haulage system. The switch gear and resistances at this sub-station are shown in the lower portion of the page.

In speaking of the steam and electric haulage systems, it may not be out of place to mention here that in all about 25,000 yards of 3½-in. cir. rope are in use and moving when the colliery is in work. This will give some idea of the extent of the workings, and also of the large amount of dead weight on the engines when the weight of the rope is borne in mind, altogether apart from the coal which is clipped on to it to be sent to the surface.



THIS PICTURE will show the evolution of waggon type adopted by the Company.

The small waggon on the extreme right of the picture has a capacity of 4½ tons. It is not fitted with either springs or boxes, and was the one in use at the time the Bellambi Coal Company, Ltd., acquired the South Bulli property.

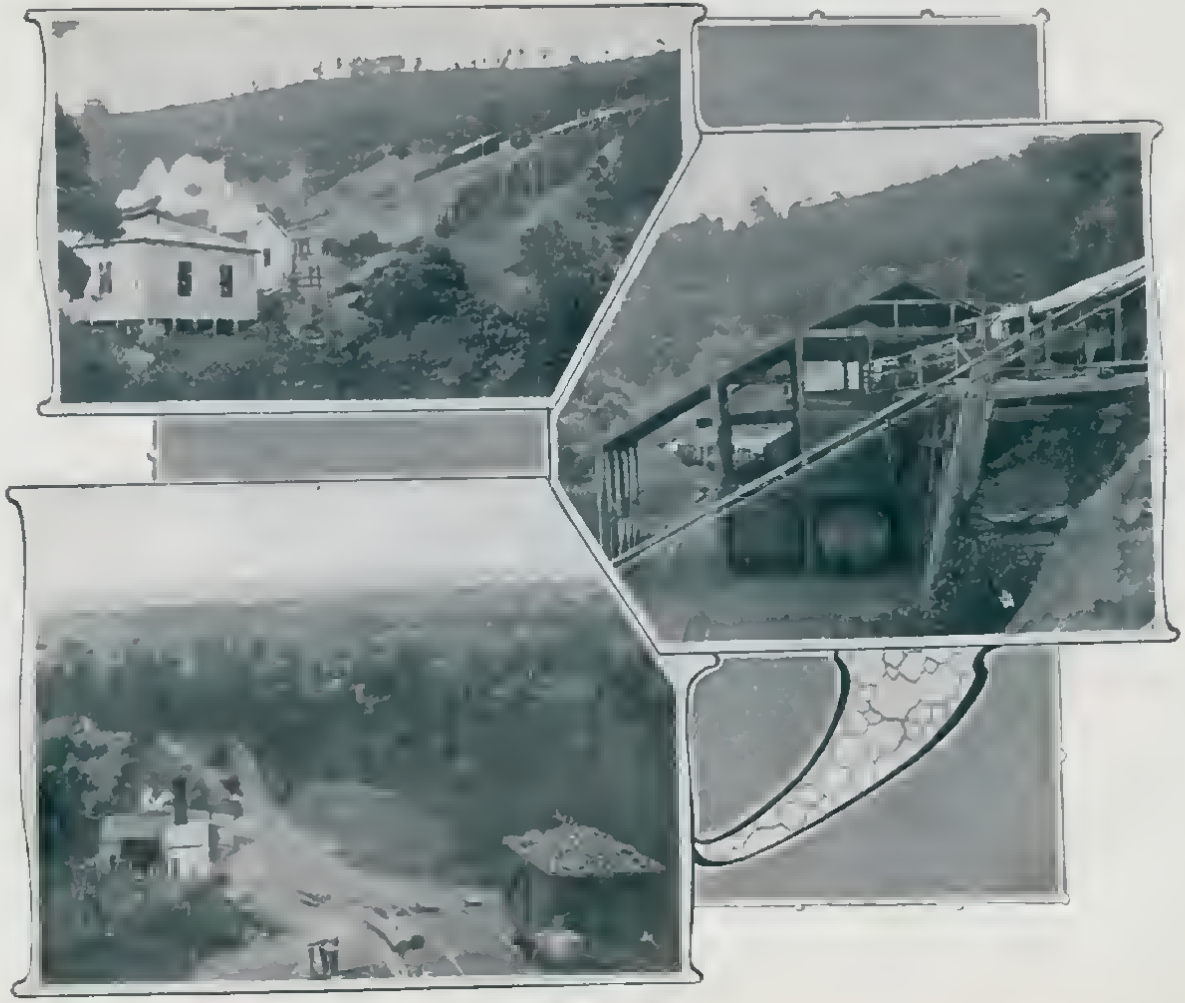
Shortly afterwards 1,000 tons capacity of hoppers were ordered of the type represented in the middle of the picture. These are not waggons, but hoppers, and are emptied by the opening of doors below the waggons, thus saving a good deal of breakage in shipment at the jetty, where any tipping up either by kick-up on the jetty or by ram is entirely avoided. These waggons have a capacity of 7½ tons each.

This year the company completed an additional 2,000 tons of waggon capacity of the type shown in the foreground. These waggons are fitted with buffers, springs and axle boxes, and are passed to run over the whole of the Government railway lines of New South Wales. Their capacity is 10 tons each, and they represent in their construction the most up-to-date form of waggon, in which every improvement suggested by the Company's experience of former waggons has been adopted.

The total waggon capacity of The Bellambi Coal Company, Ltd., amounts to about 4,000 tons, which, with its collier and hulk capacity of 7,000 tons, gives a total storage in cases of emergency of about 11,000 tons, equal to nearly five days' output.

THIS IS A VIEW of the pit top incline and screens at Bellambi Colliery, adjoining and worked in conjunction with the South Bulli Colliery, and practically giving another haulage tunnel from that mine. It will be observed that this incline is far less steep in its gradient than that at South Bulli Colliery, but it is worked on exactly the same principle. The private railway connecting this mine junctions with the South Bulli line about half a mile North of the jetty.

The system of mining and working is carried on under the same conditions and principles as the South Bulli mine, and the output from this tunnel is about 450 tons per day.



THIS PAGE shows a scale drawing of Bellambi Harbour, with full particulars of the moorings, and the following particulars of the jetty will be found useful to masters visiting the port:

Length of timber structure on high side for loaded trucks from land to sea end, 1,630 feet

Length of timber structure on low side for empty trucks from land to sea end, 1,220 feet.

The jetty extends 970 feet seawards beyond high water mark, and 900 feet seawards from low water level.

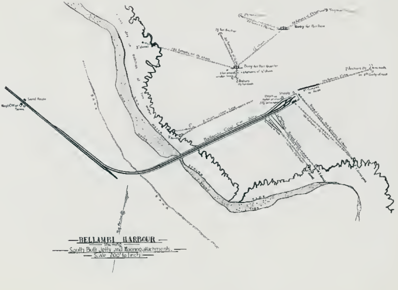
The height of jetty above low water mark is 32 feet.

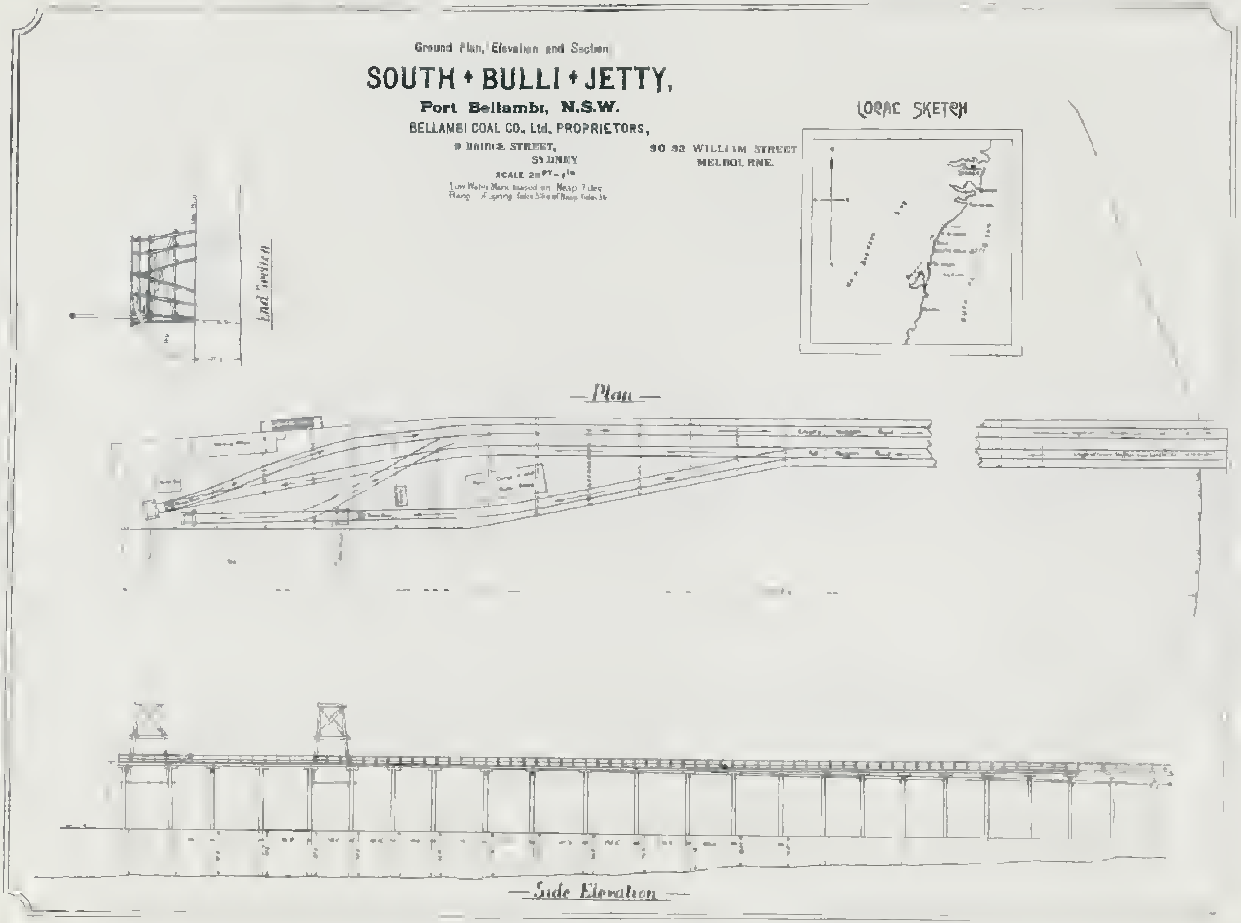
The depth of water at inner and outer shoots is 22½ feet at low water.

The vertical distance between low water mark and bottom of delivery end of shoot is 17½ feet. The delivery end of shoot extends horizontally beyond edges of jetty piling 16 feet

Low water mark is based on neap tides. Surveyor Halligan states that the range of spring tide is 5½ feet and neap tides 3½ feet.

The details of moorings have been marked on the scaled drawing.


BELLAMBI HARBOUR
Showing
South Bulli Jetty and Mooring attachments.
Scale 200' to 1 inch



SCALE PLAN AND ELEVATION OF SOUTH BULLI JETTY.

THE VISITOR has now in imagination seen the whole process of treating the coal from the time it leaves the pit's mouth and is shipped into the colliers, and has also taken a walk through the mine entering the main West Tunnel, visiting the inner sections and power stations, and returning through the new tunnel out of the 4ft seam by the skip incline, from whence he would be conveyed by the Company's locomotive to the South Coast railway line and take his return journey to Sydney

On arrival there the collier he has seen loaded will go alongside one or other of the contract lines supplied by the Company, where the coal will be discharged by the coal lumpers, taken delivery of on board the receiving ship, and trimmed into bunkers

The method adopted for this purpose in Sydney differs in many respects from those in other parts of the world The coal is filled into baskets, the contents of which by Act of Parliament, must not exceed 2cwt. of coal. This is hoisted up by friction winch, and a coal lumper, known as the "planksman," steadies the rope carrying the basket and as it rises from the hold swings it steadily inboard, so that when it arrives at the proper height it is landed plumb on the rail of the receiving ship, from whence it is carried on the shoulders of the coal lumpers technically known as "carriers" and dumped by them into the different receiving shoots or holds of the steamer, a large number of other coal lumpers designated "trimmers" being used to trim the coal as it runs down the shoots and fill it into bunkers.

The average working capacity of a complete gang of 1 planksman, 4 shovellers, 1 winchdriver, with 4 carriers and trimmers represents about 9½ tons per hour, and the number of gangs that can be put on is regulated by the receiving space of the ship.

The colliers are fitted with ample derricks so as to coal various shoots, side ports or holds, and it is not uncommon in case of the coal received over the deck of the receiving ship for the planksman to be working 40ft to 50ft. above the hold, and obviously considerable skill is required to satisfactorily carry on this work

The planks used are of Oregon, of 3in. thickness and 18in. width, and these are balanced from the steamer on gaffs hoisted level with the rail of the receiving steamer, the other end resting on the rail itself, giving a level walk for the planksman.

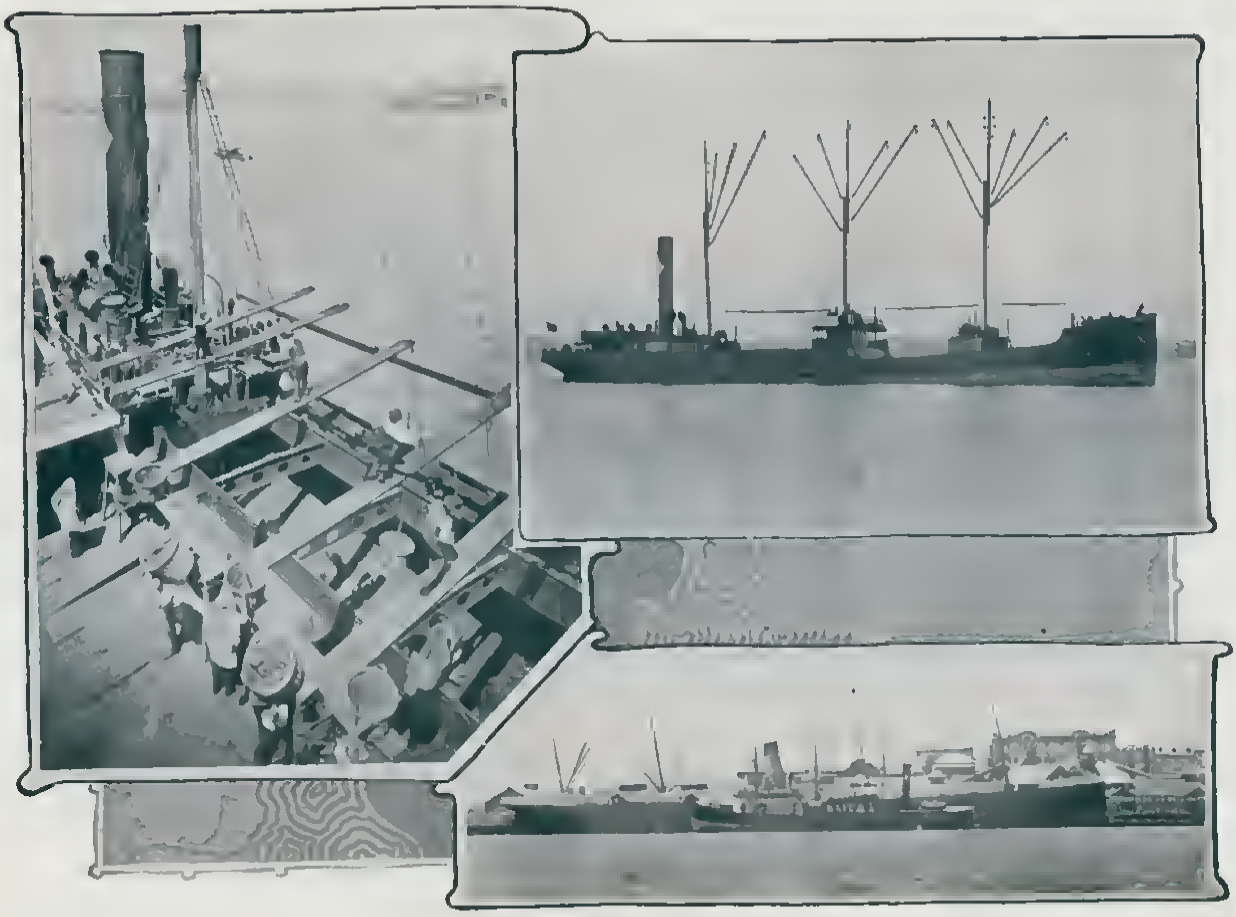
The right hand upper picture represents the collier "Bellambi," which the visitor has already seen loading at the jetty, coming alongside a steamer in Sydney with all her gear fitted for discharging, and it will be seen, by counting the gaffs, that provision has been made for working from 12 gangs simultaneously, when the conditions admit of same. The winches of this collier, which was specially designed for the Company and the requirements of their trade, are placed on bridges forward, amidships and aft, so as to afford the driver a clear view over the holds, and in the photograph the gaffs are shown rigged ready to carry the plank across which the planksman will walk from the collier to the receiving ship.

In the lower picture will be seen the collier "Bellambi" alongside the mammoth White Star steamer "Medic." The vessels of this line take on an average about 4,000 tons monthly from the Company, and this is placed on board them at an average rate of about 80 tons per hour.

Work is carried on by the coal lumpers day and night in Sydney, so that given fine weather, coaling is effected with good despatch, but owing to the danger of walking the plank in wet weather, all coaling work is stopped in Sydney should there be any rain falling.

The left hand picture gives an exceedingly good view of the process of discharging and carrying the coal. On the extreme right of the plank will be seen a planksman steadying the basket as it descends into the hold, while with the next planksman the basket has nearly descended to the coal level, and in the photograph the shovellers can be seen in the hold of the steamer with the full baskets ready to be chipped on as soon as the empty basket is unchipped. The third planksman will be seen steadying the full basket of which the winch has taken the weight and which is just about to rise.

In the section of the steamer represented, which represents the after end only, 5 gangs are working. The carriers will be seen taking the coal away from the steamer's rail and transporting it on their shoulders to the different receiving shoots. The photograph is a remarkably lifelike one and gives a clear idea of the general process of coaling in Sydney.



THE LEFT-HAND PICTURE is a view of the steamer "Bellambi," taken also alongside the mammoth White Star steamer "Medic" during the process of coaling. On one of the planks will be seen the planksman in the act of swinging the basket across on to the rail, and in others they are in various attitudes referred to in previous illustrations in connection with the work.

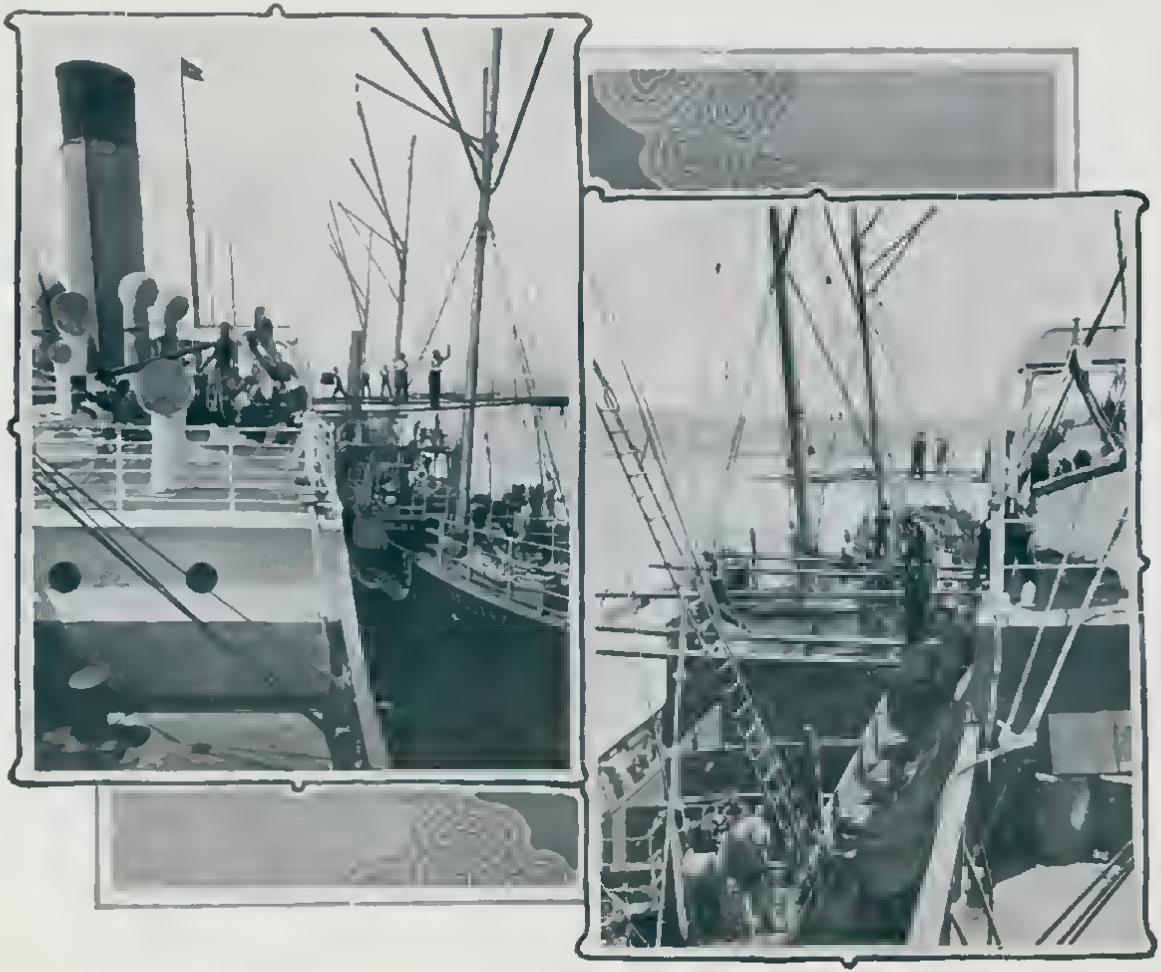
At the time this photograph was taken ten gangs were working at the collier, delivering coal to the "Medic" at the rate of little less than one hundred tons per hour.

The coal from the fore end of the collier is being discharged on to the bridge deck, and in the case of the five gangs shown in the picture, the planksmen are working at a height of nearly sixty feet above the hold of the collier "Bellambi"

In the right-hand picture will be seen a view of the collier from aft looking forward. Here will be noticed the winchman watching the rise of the basket, the planksman running along the plank, and another planksman just unhooking a basket which he has landed on the rail of the receiving steamer. Here will be clearly seen the five gangs in the after hold of the ship delivering the coal on to the main deck, while the forward gangs are delivering coal on to the bridge deck, and this picture is one of the clearest representations of coaling in Sydney that has ever been taken, and has been reproduced in several of the weekly illustrated papers of New South Wales.

The very large amount of running gear involved and necessary is clearly shown on the collier. To the uninitiated it appears a regular tangle of lines, every one of which, however, has its special purpose, and the position of which has been regulated so as to make the swing of the basket as easy as possible, and to prevent any clashing between a large number of gangs working simultaneously.

During the last twenty years the Company has handled nearly eight million tons of coal, with only one fatal accident, so that, complicated as the system may look, results will prove it to be as safe as care and forethought can make it.



ON THIS PAGE will be found a series of views of the steam colliers "Currajong" and "Malachite" coaling the new Orient Royal Mail Steamer "Osterley."

This steamer, like most modern boats, has to be coaled simultaneously from both sides and equal quantities of coal placed aboard simultaneously from each.

The Bellambi Coal Co., Ltd., has for the last twenty years supplied the Orient line of Royal Mail Steamers with all their requirements and has at present a long dated contract running with them for the continuance of their supplies, which absorb on an average over 60,000 tons yearly.

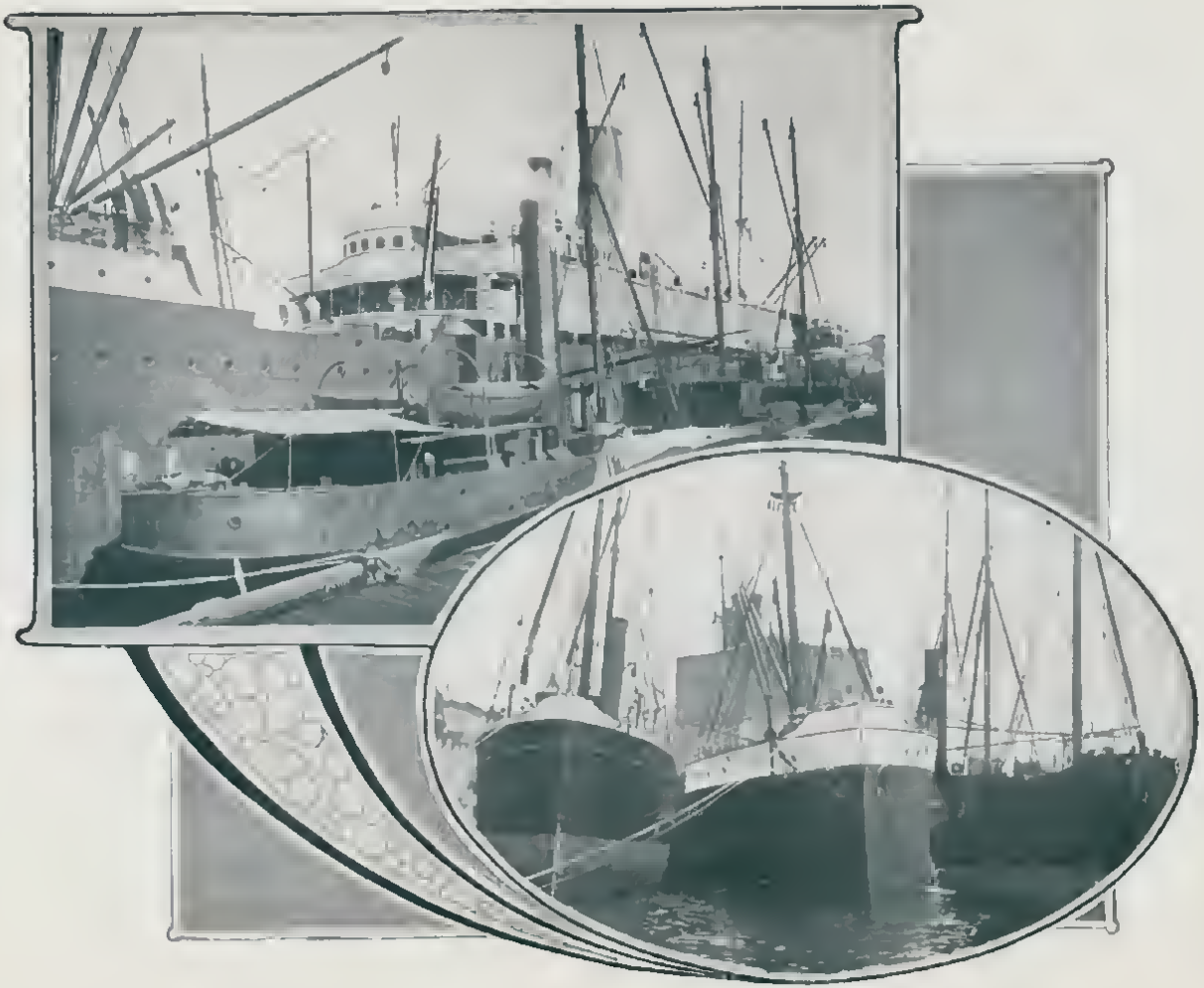
THIS photograph represents the steam collier "Marjorie" coaling the Norddeutscher Lloyd steamer "Schamhorst."

The Bellambi Coal Co., Ltd., has held the sole contract to supply this Company every since their original entry into the Australian trade.

On the starboard side of the steamer may be seen the masts of the collier "Werfa," which at the time was working alongside her.

Owing to the longitudinal bulkheads in most modern steamships, it is necessary to put two colliers alongside and to discharge simultaneously from both sides in order to keep the receiving steamer upright.

Below is shown the N. D. L. steamer "Prinz Sigismund" being coaled ex Company's Colliers "Marjorie" and "Malachite."



THIS picture represents the Company's steam collier "Marjorie" discharging into the Nippon Yusen Kaisha steamer "Nikko Maru," a line of boats for which the Company has held the contract since they first started running to Australia.

THIS PHOTOGRAPH taken in the office of the Bellambi Coal Co, Ltd, represents a working model to scale made by the builders and sent out to them with their new steamer "Bellambi," which will serve to illustrate the great area of the steamer's hatches. She is in fact a big shell arranged to take coal over all and to discharge it over all, according to the requirements of the receiving steamer, and having, like all the Company's steamers, her engines placed aft, she is at all times in trim, either to shift in harbour or to proceed to the collieries after partial discharge to load up the balance of a further cargo.

The size of the hatches in this steamer are:—

Forehold	25ft x 16ft	Mainhold	37ft 3in x 16ft
Afterhold	47ft 10in x 16ft		

And her other particulars are:—

Length B.P.	244ft	Breadth Mld	31ft 3in.
Depth Mld	17ft.	Engines	18in, 30in., 48in x 33in
Speed	10½ knots.	Deadweight	1,640 tons

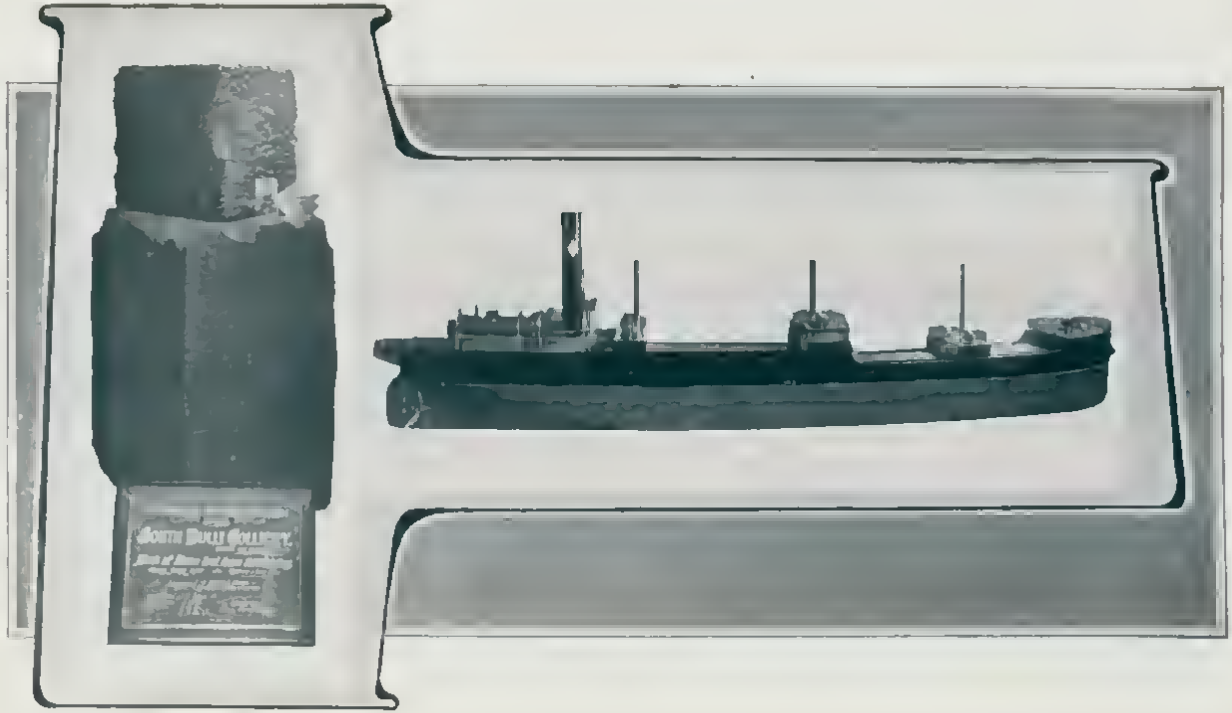
The whole of the Company's fleet, with the exception of their oldest steamer, "Currajong," are classed 100 A1 at Lloyds, and maintained in that class, and a rule of the Company provides that Captains and Chief Officers on their colliers, although only engaged in the coasting trade, shall both hold Foreign-going Masters' Certificates.

This picture also shows two blocks of coal sawn from the seam, the larger of which was exhibited at the Mineral Exhibition in Sydney in 1906. The seam where this block was sawn out is 10ft high, and the lower block is 3ft x 2ft. x 1ft. 6in., and the bottle and glass have been placed on top of it to give some idea of its relative size. The weight of this block is approximately 6 cwt.

On top of it will be seen a small block, 18in. square and weighing approximately 2 cwt., which block was shown to visitors on the occasion of the Associated Chamber of Commerce meeting in Sydney.

The South Bulli and Bellambi coal as hewn and as delivered to steamers will stow in an average bunker space of 39½ft. Its analysis and evaporative qualities have already been mentioned.

With this picture of a block of coal safely housed in the Sydney office of the Company, this short description of the Company's operations may well be brought to a close, and while it is impossible to adequately give a consecutive idea of the local conditions of coal mining as carried on in the Company's property, it is hoped that these photographs taken at the actual scene of operations, both above and below ground, will prove of interest to the many friends of the Company, and especially to those valued constituents, who, having for many years been supplied by it, and having several times renewed their contracts, are in the best position to speak as to the qualities of the mineral produced.




BELLAMBI HAVEN